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MADRAS PRESIDENCY

Scale of Miles
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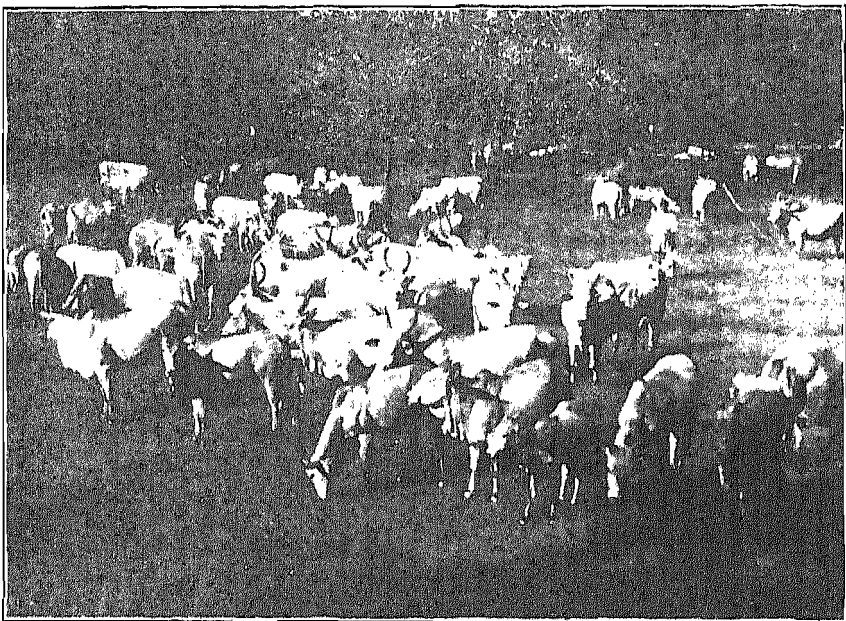
REFERENCE Breeding Tracts

- G ☐ Coomour
- ☐ Ongole
- ☐ Mysore
- ☐ Alambadi
- ☐ Kangayam
- ☐ Jelicut

DISTRICTS

- 1 Ganjam
- 2 Vizagapatam
- 3 East Godavari
- 4 West Godavari
- 5 Kistna
- 6 Gunter
- 7 Kurnool
- 8 Bellary
- 9 Anantapur
- 10 Cuddapah
- 11 Nellore
- 12 Chittoor
- 13 North Arcot
- 14 Chingleput
- 15 Madras
- 16 South Arcot
- 17 Salem
- 18 Trichinopoly
- 19 Tanjore
- 20 Ramnad
- 21 Tinnevely
- 22 Madurai
- 23 Coimbatore
- 24 Nilgiris
- 25 Malabar & Anjengo
- 26 South Kanara

NOTE—
The Longitudes are referable to the Greenwich
Meridian, taking that of Madras Observatory as
80-14-54 East.



KANGAYAM COWS, HONUR.



GOVERNMENT OF MADRAS

LIVESTOCK
OF
SOUTHERN INDIA

BY

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MADRAS

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1936

FOREWORD.

1. A number of books have been written on the various so-called breeds of Indian cattle but this is the first attempt which has been made, by an all-time livestock officer of long service in India, to deal exhaustively with the breeding and maintenance of livestock in the area with which he has been concerned.

2. Mr. Littlewood, in this account of the cattle of Southern India, in fact gives a wealth of information which could only have been obtained by constant study of the breeding, care and management of livestock, by a specialist devoted to the subject.

3. It is clear that in the South, as elsewhere, the conditions under which cattle are maintained and employed are undergoing changes, the result of the progressive restriction of the grazing areas which is taking place; the more extended use of mechanical transport on the roads; and of changes in the system of agriculture. For this reason the precise descriptions of the different so-called breeds of Southern India, and the excellent photographs and exact measurements given in this book are valuable as a permanent record, for future comparison as to the extent of any improvement or degeneration which may occur.

4. As to the validity of the claim of some of these cattle to be classified as distinct breeds there may be some question, but the photographs in particular clearly show, what must be obvious from any close examination of the indigenous cattle of India, that certain basic types exist, in fairly well defined areas, and that many of the so-called breeds are merely varieties of these types or the result of cross-breeding between them.

5. In such a country as India, where there are no official stud books maintained by private agency the maintenance of exact registers of all the more important indigenous breeds of farm livestock should in fact be an important function of Government, and as a basis for the definition of breed characteristics, Mr. Littlewood's book should prove of value.

6. A very important matter which this book will serve to again bring to notice is the criminal wastage of the best dairy cows obtainable after they have completed one lactation in a city; in a dairy-herd or a wealthy owner's compound. By this means the best milch breeds are being steadily depleted of their high-yielding strains, instead of being improved, and unless something effective is done, and done quickly, to alter the present system or lack of system of milk supply in cities, this steady deterioration of the best breeds of Indian milch cattle is bound to continue. Apart from sanitary considerations, the organization of a regular supply of milk to all cities from outside and the prohibition of the keeping of cows or buffaloes within city limits are therefore among the most important and urgent animal husbandry matters requiring attention throughout India.

7. The section dealing with the systematic attempt which has been made, at the Hosur Farm, to establish a breed of Anglo-Indian cattle, is of particular interest since it shows that, after years of careful work under very favourable conditions, the results of such cross-breeding have on the whole been disappointing. This is in accordance with world-wide experience of European cattle within a wide tropical belt encircling the entire globe. Within this zone, pure European cattle have, as a rule, failed to hold their own even when, as in Southern States of the United States of America, the disease conditions which were previously a severe limiting factor, have been brought under control. Moreover, there is abundant evidence in India that in the hands of inexpert

breeders irreparable damage can be done, to existing herds of pure-bred stock, by the unscientific use of foreign breeds. On the other hand, the results achieved by the Military Dairy Farms, show that within a reasonable short period of time, it is possible, with scientific breeding control and management, to build up from indigenous breeds of Indian milch cattle, high-yielding strains which are quite able to compare favourably with European or cross-bred cattle and it is very clear that this is the proper policy to pursue under existing conditions.

8. Good indigenous breeds, suited to the climate, already exist in the areas naturally suitable for stock raising and there is no doubt that with carefully controlled breeding systematic castration of inferior animals, organized disease control, and the proper feeding of stock—young and old, male and female—combined with improved marketing of livestock and animal products of all kinds, the huge numbers of livestock in India should be far more profitable to the country than they now are.

9. At present there are roughly 350 million domesticated livestock in India, not including pigs and poultry, and a recent estimation shows that the values obtained from them (including the value of their labour but not including the many crores of rupees obtained from sales of stock throughout the country) must at present prices, amount to not less than Rs. 1,500 crores a year. In fact it is clear that, with proper industrial development, the return from livestock could be increased to a colossal sum and that the livestock industries of India should constitute one of the most important commercial assets of any country in the whole world.

A. OLVER,
Animal Husbandry Expert,
The Imperial Council of Agricultural Research

INTRODUCTION.

THE question of the improvement of the indigenous breeds of cattle has been before the Government for many years, but as far as Madras is concerned, very little was done up to 1918, except from a veterinary point of view.

Several articles and bulletins have been published from time to time since 1901 when Lieut. Homes, Superintendent of the Madras Civil Veterinary Department wrote a bulletin on the various breeds of cattle in the Presidency. This was followed by Bulletins "The Cattle of Southern India" by Lt. Col. Gunn, Superintendent, Civil Veterinary Department, Madras, "Survey of the Madras Livestock" by H. C. Sampson, I.A.S., "Survey of the Madras Dairy Trade" by Allan Carruth and other departmental publications.

The Director of Agriculture considered that all these bulletins, etc., should be revised and re-written in one book and I was asked to undertake this work.

I have visited all the important breeding areas in the Presidency to make further enquiries regarding the different breeds, to observe their points, obtain photographs and measurements of the same and the method of rearing and feeding of cattle in the various districts. I also give the particulars of the various breeds maintained on Government Cattle Farms as far as possible.

From the Cattle Census of 1930 it is seen that there are nearly 22 millions of cattle and buffaloes in the Presidency, this works out to 1 animal per 2 people. There are also 20 million sheep and goats. If this number is added to that of the cattle and buffaloes it is seen that there is more than one animal per head of population. This is too many. There are a large number of old and useless animals maintained which could be profitably disposed of. This would provide more grazing and fodder for the remainder and if these were fed a little better, the quality and quantity of the manure would improve. The hides of both cattle and sheep are badly damaged through ticks and if the ryots and shepherds would only pay a little more attention to their animals and remove these ticks they would obtain a better price for their hides.

The chief centres of cattle breeding are the districts of Guntur, Nellore, Kistna, Ganjam, Coimbatore, Salem, Madura and Chittoor.

Cattle breeding still continues to be a neglected profession, several breeders stating that it does not pay them to devote much attention to this branch of work. In my opinion the ryot in order to improve his economic position, should bestow more attention to cattle breeding and should reduce the number of his stock and devote better care to the reduced number he retains, by better feeding of his cows and calves and the careful selection of breeding bulls. A method of mixed farming is advocated. In some parts of the Presidency, Co-operative Societies and District Boards are interesting themselves in this work by placing good stud bulls at the disposal of the ryot population and this should be encouraged.

The demand for a better class of breeding bull to grade up the country stock is growing and it is to be hoped that this will continue.

HOSUR CATTLE FARM P.O.,
28th January 1935.

R. W. LITTLEWOOD,
Deputy Director of Agriculture,
Livestock.

NUMBER OF LIVESTOCK IN THE MADRAS PRESIDENCY.

The Census held in January 1930.

Cattle—

Breeding bulls	..	..	..	85,283
Young bulls	..	..	..	1,315,352
Cows	..	..	..	5,622,356
Calves	..	..	..	3,423,254
Bullocks	..	..	..	6,001,071
Total				16,447,316

Buffaloes—

Male buffaloes	..	..	..	1,354,894
She buffaloes	..	..	..	1,765,694
Calves	..	..	..	1,872,826
Total				5,993,414

Sheep	..	..	..	12,864,343
Goats	..	..	..	7,406,018
Total				20,270,361

Horses—

Horses	24,761
Mares	11,954
Youngstock	3,044
Total				39,759

Donkeys	131,104
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LIVESTOCK OF SOUTHERN INDIA

CATTLE OF SOUTHERN INDIA.

THE cattle of the Madras Presidency have long been famous, and of the several breeds which are to be found in this part of the country, those designated the 'Mysore' and the 'Ongole' sometimes known as the 'Nellore' are undoubtedly preeminent. On account of its prepotency the former is most assuredly entitled to first honours as a visit to all the various cattle fairs held in the southern districts of Trichinopoly, Madura and Tinnevely, also in the more northerly districts of Anantapur, and Bellary, will show how predominating this type is.

The 'Ongoles' are very fine in appearance, and for their special purpose are unsurpassable, but they differ in almost every respect from the 'Mysore.' They are huge in size, extremely docile, and suitable for steady heavy draught, whereas the Mysore cattle are specially adapted to road work, as they are quick, very high spirited, and have extremely hard sound feet.

Indian cattle, like those of Europe, vary in most districts, either as to form, size and symmetry, or as to the growth and length of their horns, according to the varying local peculiarities of the climate, soil, and lastly but not the least, fodder. It may be stated that both natural and artificial fodder tend to influence the form, size and character of the animal.

Ordinarily the ryot expects his breeding cows, etc., will pick up what they can in the way of pasture about the village or its adjacent lands and he very rarely troubles himself to grow green food, or prepare dry fodder for them; the same plants which supply him with grain, feed his cattle also with straw.

In most towns and villages, the cattle are driven out at all seasons to graze abroad, and in the dry season they more frequently lick the dust only, and return home with their stomachs as empty as when they started, to receive perhaps a few handfuls of straw or rubbish just sufficient to sustain life.

Madras is essentially a cattle raising province, and consequently the animal wealth is enormous, but, as in other Presidencies in India, large herds of village or mongrel cattle are to be met with everywhere. Many of them are worthless, being too weedy even to put into the lightest plough, and they are allowed to exist and eat the ration of the more profitable ones. Undoubtedly religious sentiment amongst the vast majority of the people is averse to destroying cattle, as among the Hindus, the bull has always been considered to be sacred, and indeed is worshipped under the name of Nundi, it having formed the vehicle of their deity Shiva during

his peregrinations. It is considered a most grievous sin to kill them.

The three great centres of cattle raising are shown in the accompanying map, and from these they are taken by dealers, who form a very large community, to the numerous annual and weekly markets held in this Presidency. Frequently these drovers have their regular customers, and they receive payments by instalments, but this custom is principally limited to the north and western districts. Mysore has enjoyed from a very early period a just renown for a superior breed of cattle. The generally mild and salubrious climate of the plateau, with an extensive pasture on which cultivation has not made much inroad, favoured cattle breeding, and attracted Gollas and other nomadic tribes from the north, who brought with them their excellent breeds which, being established for generations in the country, and mixing with the indigenous population, could not fail to improve them. In a country in which 90 per cent of the population subsists by agriculture, and in which cattle play a most important part, a demand for them is never wanting. Cattle manure is used as fuel or serves to enrich the soil exhausted by cultivation. The operations of ploughing, harrowing, sowing and thinning the crop, of lifting water from wells for irrigation purposes are carried on almost entirely by bullock power. The crop when cut, is removed to the threshing floor, and there trodden out by the cattle, and transported by them to the market; in fact it would be difficult for the Indian cultivator to get on without his cattle, which indeed constitute the life and soul of agriculture. The substance of the ryot is usually estimated by the number of cattle he owns, and the number of ploughs he works. Moreover cattle are intimately associated with the domestic incidents of the people.

CONDITIONS OF CLIMATE, RAINFALL AND SOIL AS AFFECTING CATTLE BREEDING, CATTLE AND LIVESTOCK.

The climate of the Presidency varies greatly in different localities, and has a considerable influence on cattle and livestock. In the markets of Coimbatore, the 'Malai-madu,' the name generally applied to the cattle of the Alambady type, always sell at a much lower price than the 'Nattu-madu' or local cattle of the hotter and drier districts of the south. In South Coimbatore the former are said to have a working life of only six to seven years, against ten to twelve years of the local cattle; while further south again in the Palni taluk, such animals are very seldom seen as they are said to last only for two or three years. In the black cotton soils of Tinnevely, South Ramnad and Madura, Kangayam cattle are now almost exclusively used for agricultural work. The same type of cattle as the 'Malai-Madu' however in the Anantapur

district is said to last for ten years. Cattle, if moved when young, get acclimatized more quickly. The Nellore breed, which supplies the bulk of the heavy cattle to the Ceded Districts and which are brought there while young, soon seem to become acclimatized and last from ten to twelve years and even longer, while full grown cattle of the same breed when taken to the southern dry districts have, it is stated, the same short life as the Alambody. The draught cattle of the West Coast are mainly taken there when quite young and are reared, and appear to become more or less acclimatized to the change.

The susceptibility of cattle to changes of climate, should be borne in mind in any attempt to improve cattle breeding by the supply of breeding bulls.

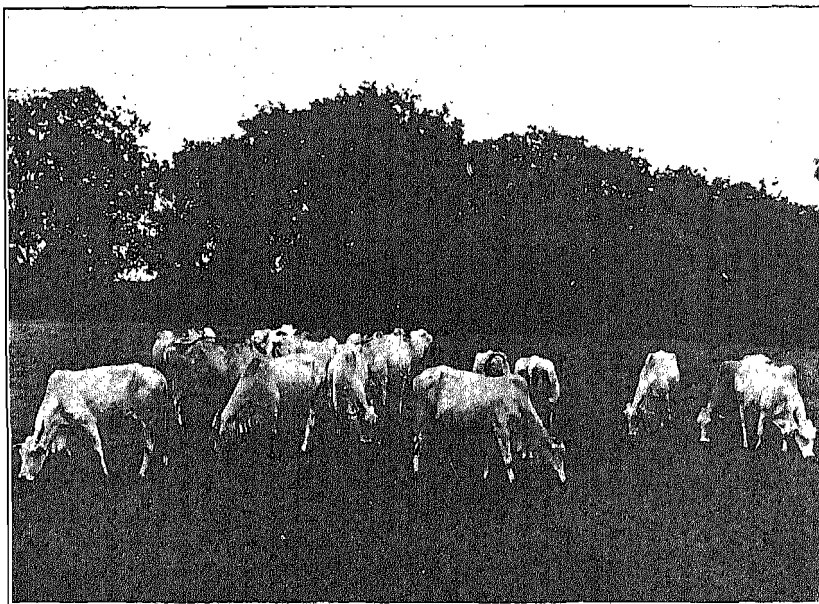
Cattle breeding is also to a certain extent dependent on the climate, but more so probably on the soil and the distribution of the rainfall. The degenerate cattle of the West Coast are a case in point. Yet, with care, it is possible to rear very fair cattle on the West Coast and in fact, there is a considerable amount of cattle rearing done in South Malabar. The local cattle of the West Coast are however usually allowed to fend for themselves and suffer at one time from abundance of quickly grown succulent pasture and at another from long periods of starvation. Yet, on the Taliparamba Agricultural Research Station some very fair cattle of the local breed have been reared, simply by making provision for supplementing pasture with dry grass or hay and silage, when the dry weather sets in. West Coast cattle can never, however, attain to any size of bigness of bone owing to the lack of lime, both in the soil and in the pasture and fodder, and, it is worthy of note that the soils of the tracts, where the Kangayam and Ongole breeds, the two best known breeds of Madras cattle are bred and reared, are both very rich in lime. Cattle breeding naturally seems to find root in dry districts or districts liable to scarcity, as instanced by the Kangayam, Ongole and North Salem district breeds. This may be due to some extent to the climate, but, more probably, it is because ryots are, in such tracts, more careful to preserve their fodder against times of scarcity and this has led to a more careful feeding and management of their livestock. Sheep again seem very sensitive to climatic conditions. None are kept on the West Coast; a few are occasionally brought there for butchering and of recent years they have been taken to Pulghat for grazing and manuring the wetlands in the dry weather; but these latter all return to Coimbatore before the rains begin. Mortality among sheep is very high when the rains set in even among the hardy hairy sheep of the hotter districts. Wool bearing sheep are practically confined to those parts of the Presidency which have a cold weather and it is very seldom that these are seen anywhere else.

CONDITIONS OF FARMING IN MADRAS AND HOW THEY AFFECT THE CLASS OF WORKING CATTLE.

Madras is a country of varying agricultural conditions and hence can make use of any class of working cattle produced.

Excepting the West Coast, the Nilgiris and Ganjam there is hardly a district, where all the main agricultural conditions are not represented, viz., black cotton soil, red or light soils, well irrigation and wet land.

The black cotton soils require heavy cattle to work them. Crops are not so precarious here as on lighter soils and usually black soil ryots keep excellent cattle and look after them very carefully often extravagantly so. Red and lighter soils require hardy, quick moving cattle. Such soils are not so retentive of moisture as black soils and hence sowing has to be done as rapidly as possible and the crops, even when they have come up, are always liable to fail. Ryots consequently are not so well off and hence cattle on lighter soils are usually of much poorer quality than those on black cotton soils and are not so well cared for. It is, however, becoming increasingly common for ryots on light soils to buy good young stock and rear them carefully. These can be put to light agricultural work when quite young, and are sold, when broken in and trained for work, when they have from two or three pairs of teeth, or sooner if the seasons are adverse.



ONGOLE COWS AT HOSUR.

Cultivation under wells, where bullock power is used for lifting water, requires medium sized, strong, well built bullocks. If the wells are very deep (as in Coimbatore) or the buckets are very large (as in the Ceded Districts), similar animals to the black soil cattle are used. Wet land cultivation—especially in the large irrigated tracts utilizes what might be termed, the dregs of the cattle market; either light buffaloes or light cattle, which will not sink too deep into the puddled soil, and which are not much loss if they cannot survive the unhealthy conditions, under which they have to work, and the sudden heavy strain put on them to get the land prepared in due season. Buffaloes are not so much in demand in the large deltas as cattle, since there is greater loss among these when they have to be sent away for grazing when the whole country is under water, during the crop season.

GRAZING AND CONDITIONS UNDER WHICH BREEDING IS CARRIED ON.

The question of grazing is becoming more and more insistent as the area of cultivation increases, and therefore, the question deserves examination.

Communal grazing.—This consists of grazing on land to which every one in the village has an actual or accepted right. This is comprised of communal lands set apart for the purpose, of unassigned waste lands, of tank beds, the sides of drains, roads and other porambokes; usually also of harvested wet lands and of dry lands which have been left fallow. Many of these courses of grazing are constantly being reduced in area and thus the ryot, who has depended on free grazing from time immemorial is on all sides beginning to feel, and sometimes acutely the lack of pasture. As time goes on and cultivation continues to expand either intensively or extensively, he will feel it more and more, until some other method of farming is evolved, which includes the care of his animals. In some parts of the Presidency, this evolution can be seen even now, of which the Dharapuram taluk of the Coimbatore district is an example. This is a taluk where there is no culturable waste, no communal grazing land, and no forest grazing, yet, it is one of the best known cattle breeding centres of the Presidency, and its cattle have a higher market value than any other, besides which, it contains some of the best garden cultivation to be seen anywhere in India, as well as an excellent system of mixed farming.

As far as the maintenance of the quality of the stock is concerned, nothing can be said in favour of communal grazing, in fact everything is against it. Where there is communal grazing,

every ryot in the village naturally claims as large a share of it as possible, with the result that grazing lands are always overstocked, are never given a rest and are usually little more than exercise grounds for cattle. In many cases the number of cattle maintained is in excess of the ryot's actual requirements as well as the number which he can normally supply with fodder in the dry season, and though the animals manage to exist for a time on a starvation diet, they are very prone to cattle disease and to suffer from changes of season. Enquiry into the hide trade shows that the supply of hides is always greatest when the rainy season commences. Not only do animals die under this treatment or lack of it, but the female stock breed very irregularly, and if the cows are not barren altogether, they seldom calve more often than once in three to four years. Communal grazing is and must be mixed grazing, and since male stock are never castrated before they reach maturity, this leads to the evils of in-breeding and promiscuous breeding and often permanent injury to the young male stock from serving cows when too young. Thus, even if the ryot was desirous of improving his stock by more careful breeding, this is impossible as long as he has to depend on communal grazing.

Forest grazing.—This is ordinarily the grazing of cattle in the reserved forests on payment or a nominal fee per head, though in times of scarcity, the forests are thrown open, when necessary for free grazing. Normal forest grazing can be divided into three classes :—

- (1) Cattle which live entirely or almost entirely in the pens there, i.e., breeders' cattle, such as those of East Kollegal and West Dharmapuri and Hosur.
- (2) Cattle belonging to villages adjoining forests which are occasionally breeders' cattle, but more often are kept, either for the sake of manure which they supply or for the sake of prestige.
- (3) Cattle, which come from a distance to graze in the forests during the cultivation season.

Cattle which live entirely in the forests.—In the forests of Kollegal, North Bhavani, Dharmapuri and Hosur, which represent the most important area of forest breeding, the cattle, which graze in the forests are cows with their calves; except for the breeding bulls which run with the herds, no other male stock are seen. The male stock are annually sold as yearlings at big fairs such as Mahadeswaramalai, Gettisamudram and Mecheri and find their way into the hands of ryots who rear cattle. Throughout North Coimbatore, North Salem and West Chittoor as well as in the adjoining territory of the Mysore State, the rearing of bullocks from these

forest bred cattle is a most important industry. It not only forms a profitable method for ryots to realize the value of their available straw, fodder and grass, but it also forms the main supply of heavy draught cattle for Malabar, West and North Coimbatore, Chittoor, North and South Arcot, while the pick of such animals are taken further south to Tanjore, Trichinopoly, Madura, Tinnevely to be used either as coach bullocks or for heavy draught. This breeding is one of the finest object lessons one can see in the Presidency to show the value of not mixing the cattle when grazing. The cows though miserable in condition, when they were seen in the hot weather, were all big framed animals, while the bullocks, reared from calves produced from these herds, show still more clearly how valuable it is, even when grazing is limited, to select and keep good breeding bulls. These Salem and Alambadly cattle are very different from the animals which come from the Bhadrachalam forests of the Godavari district, which are small ill-bred animals. In the cattle, which come from the latter district, one sees all the evils attending mixed grazing; the surplus male stock are never sold until full grown and fetch very low prices.

Cattle belonging to villages adjoining forests.—It is a noticeable fact that the nearer the cattle are to the forests the more degraded the type and it is here that one sees all the evils of mixed grazing. It is seldom that these forests at low elevation are able to provide grazing throughout the year. With such light grazing fees, large herds of cattle are maintained and it is usually the case that such animals in the dry weather are barely able to exist. The ryot has not the fodder supply necessary to maintain his cattle in such numbers in the dry weather. In many places such animals are maintained simply as a cheap and easy method of manuring the lands. The young stock produced are so poor that they are capable only of the lightest work and often ryots who own large numbers of cattle have actually to import their working bullocks. In other places a man's position is gauged by the number of stock he maintains. Often he is entirely dependent on the forests for their maintenance. The Cumbum valley in the Madura district gives a striking instance of this. Here many of the owners of the largest herds of cattle are merely landlords, leasing out their lands on varam, in which case the tenant gets the straw, which should be the reserve fodder supply in the dry weather. Here all the best animals are owned or reared by cultivating ryots.

The Cumbum valley forms an interesting problem with regard to grazing. Cultivation has now reached its utmost limits and any further extension must be in intensive cultivation under wells. This means a constant supply of mhote bullocks, which cannot be maintained by reliance on the forests, and by the present lack of

system in breeding. If the people were dependent on themselves for grazing, it would be quite possible for the valley to develop in the same way as the Dharapuram taluk of Coimbatore and a system of mixed farming adopted. The soil is rich in lime, it forms an excellent pasture, while the maintenance of the well-water supply must depend on the proper maintenance of the forests. Private pasture land, careful conservation of manure, combined with well irrigation, would greatly add to the production of the valley, while, when the breed of cattle has been worked up, there is no doubt that the profits from stock raising would be great. Even now the smaller ryot, who has straw fodder for the dry weather, can get Rs. 100 per pair more for cattle which have been hand-reared than the owner of large herds can get for those which are dependent on forest grazing.

Cattle sent to the forests from distance for grazing.—For delta and other tracts where cultivation does not allow of pasturage, it is the custom to send cattle often long distances for grazing. Grazing facilities in such cases are essential and it is usually the reserved forests that people have recourse to. In the case of the northern deltas the more well-to-do cultivators send their cattle to private grazing grounds in the dry taluks of the districts; but the ordinary run of delta cattle, both from here and from Tanjore, are sent to the reserved forests for grazing. That private grazing is appreciated is shown by the high grazing rates which ryots are prepared to pay, and in all probability, it is cheaper for them in the long run, as the animals are well cared for, come back in good condition, and, except when there are outbreaks of cattle disease, there is very low percentage of loss. In the northern deltas it is important that the cattle should be in good condition when they return, as they are immediately required for threshing the paddy crop. Everywhere on the delta in the Godavari and Guntur districts, complaint is made of the increasing mortality among cattle sent away to the forests for grazing. The animals there, are left in charge of Sugalis, who, it is stated, make a considerable income out of the sale of green hides, etc., and consequently it is to their advantage if the animals left in their charge die. As the hide supply is being exploited more and more, the mortality among cattle under the present system of grazing naturally becomes greater.

Forest grazing is always a serious menace not only to the forests but to the water-supply of wells and tanks. It is more so where grazing is continuous as the cattle are then in the forests when these are dry. Grazing and forestry are, and must be, at variance; for, as the forest canopy increases, the grass tends to disappear and the simplest way of lessening the shade and increasing the grass is by forest fires. Yet, certain kinds of forest graz-

ing are of great importance. The North-West Salem and North-East Coimbatore forests supply a large share of the heavy draught cattle of the south and probably, this is of more importance to the country than the maintenance of heavy timber forests in places, which are not readily accessible for extraction. Cattle-breeding is on the increase in the North Salem district, especially in Hosur and Dharmapuri taluks. This may be due to the reduction in the charge for grazing fees. The Forest department now make a nominal charge of 8 annas per animal per year and the cattle are permitted to graze over the whole district for one yearly payment which is about 600 square miles and grazing is on the increase. Something might be done to increase the number of tanks for providing water for cattle in the forests, as the animals have often to suffer severely from the lack of these. In places, where it is customary for cattle from other districts to be sent for grazing, a system of grazing reserves might be advisable, i.e., reserves where grass, and not forestry is the first consideration. This would not only protect the forest proper, but it would be possible to keep the animals in better condition and thus check the heavy mortality of which, in many places, there is complaint. Lately several blocks of forest reserves have been handed over to village panchayats as grazing grounds for their cattle and these are completely controlled by the panchayats. This system appears to be much more popular and it is to be hoped that these bodies will pay strict attention to the number of cattle grazing in these reserves and not allow them to be overstocked and that they will do all they can to improve the quality of the grazing.

In the Nellore district where the private grazing lands are owned and leased out, the mortality among the animals is reported to be much lower than in other districts which depend on forest reserves; moreover the owners or lessees of such lands take very good care that the pastures are not overstocked. Grazing reserves would not necessarily mean a depletion of trees. A certain number are always required for shade. Dharapuram taluk where private pasturage is common, is possibly one of the best wooded of any agricultural taluk, and the bulk of these trees are grown in private pastures. The private pastures of Guntur can always be located by the excellent growth of babool trees on them. People already pay considerably more for grazing on private pasture than they do in the reserved forests, and if sufficient pasturage is provided to keep animals in good condition, there is no reason why higher rates should not be charged for such grazing if it were found that it could not be provided at the present rates except at a loss. If such grazing were regulated, pastures not overstocked, and manure not removed from the ground, excellent pasturage should in time be formed; and it might be possible by the introduction of good

bulls greatly to improve the class of cattle of a district. Mr. Sampson states :

Where cattle are maintained in the forests, simply as a cheap means of manuring the land, it seems only to retard agricultural development. The people are quite satisfied to remain dependent on the forests for their manure supply, instead of depending on and developing their own resources. The garden cultivator of South Coimbatore is entirely dependent on his own resources for his manure supply, and yet the garden lands here are as well maintained as anywhere in the Presidency. His cattle are also utilized as manure producers but they are well-fed animals and produce manure not only in greater quantity but of much better quality. Nothing seems to develop agriculture so much in this country, as when the ryot has to depend on his own resources, and this seems more especially the case as regards cattle-breeding and rearing. The manure supply from forest grazed cattle, moreover, is seldom required except for wet or garden lands, and the forests are of much more importance, as a protection to the water-supply, than as a means of supplying cheap manure through forest grazed cattle.

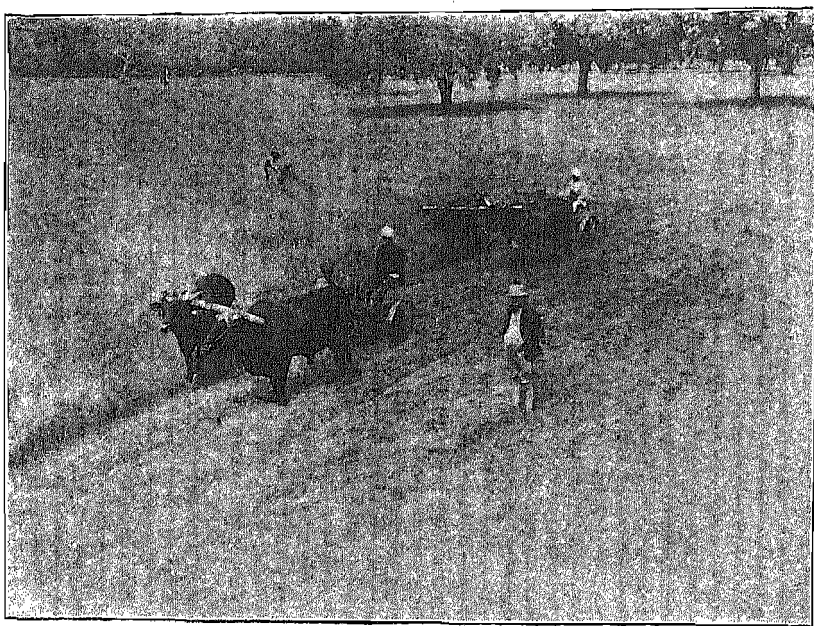
Private grazing areas.—Private grazing areas are of great value and importance to the country and every encouragement should be given to increase these. Everywhere where private grazing grounds exist, the cattle are good and care is taken to breed and rear good animals. This class of grazing can be divided into : temporary and permanent pasture.

Temporary pasture consists of harvested dry fields of patta lands left waste, (though in many cases these are treated as common grazing lands) and of patta lands which are sown down to pasture. Permanent pasture includes, patta land reserved for pasture, either on single or joint patta, and either for a leased rental, or for the pattadars' own enjoyment.

Dry lands newly harvested are usually considered as private grazing. There is often a considerable amount of gleanings in the shape of the fallen pulse and cereal leaves and, until this fodder supply is exhausted, such lands are usually reserved for the grazing of the cultivator's own cattle. Patta lands, which are left waste, are occasionally treated as private pasture, but more often than not, are treated as common grazing land.

The only two places where patta lands are regularly set apart for grazing, i.e., for temporary pasture, are in the two noted cattle-breeding centres of " Plains cattle," viz., the Ongole-Kandukur tract and the Dharapuram-Palladam tract. In the former tract, permanent pasture is perhaps common : since the soil is very liable to wash, and there are large areas of patta lands which cannot

be cultivated, such as the lands adjoining rivers and streams. These streams can always be traced by these grass lands and by the growth of babool which gives the requisite shade for pasturage. But besides this, temporary pastures are also common; even small areas of 3 to 4 acres or less are left for pasture, showing that even the smaller ryot of these fertile soils realizes the value of pasture for his cattle. Such temporary pastures are all of spontaneous growth and are not sown. In the Kangayam tract good pastures are often left for 20 to 30 years before being broken up. It is here that the famous Coimbatore grass known as the "Kolukkattai Pullu" (*Pennisetum cenchroides*) is found and the seed of this grass is regularly sown, mixed with a cereal, when land is to be laid down. Here private pasturage is rendered much easier by the practice which prevails of fencing the fields. This, moreover, is the only place in the Presidency where anything like systematic grazing is carried on.



MOWING GRASS AT HOSUR.

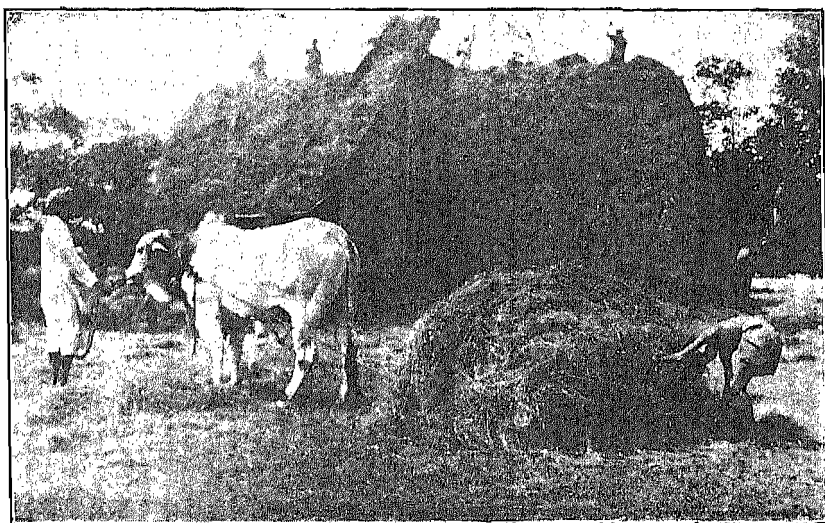
Permanent pasture.—The practice of maintaining permanent private grazing grounds, although in some parts it is giving place to dry cultivation, in others it is showing signs of development and this should receive every encouragement as it is the first step towards the improvement of livestock. The practice is common throughout the Nellore district and in the Kistna and Godavari dry

taluks, as well as in the north of Salem and in the Punganur Zamindary of the Chittoor district, while a few cases have come to notice where the system is of quite recent origin, even in parts where forest grazing is considered good. It is held by some that the cultivation of grass on patta lands lessens the yield of food grains but it is a moot point whether this is so. Land laid down to temporary pasture is greatly enriched and when ploughed up again, gives much better yields of grain. Moreover private pasturage enables the ryot to maintain not only his working animals, but also his small breeding herd, and if he owns his well in addition to dry land, he is enabled to manure his garden lands well and to meet his own supply of working bullocks. Thus, though the dry lands may not directly produce cereals when under pasture, they tend to increase the production of the garden lands, and after all, except perhaps on black cotton soils, the production from the land is very largely governed, not by the area cultivated but by the amount of manure available.

FODDER SUPPLY.

The fact that one district or part of a district can usually supply another or another part shows that in the normal seasons the supply of fodder, under the present system of livestock management, is more than sufficient. This is so in many places, for instance old straw stacks are to be seen from Ganjam down to Nellore wherever paddy is grown, while in the deltas it is no uncommon thing to see straw stacks two and three years old. In the black soils of Guntur and Kandukur, old stacks of cholam straw are a common sight. Madras is very favourably situated, as regards rainfall and water-supply, as far as its fodder supply is concerned. The cattle in irrigated tracts are usually animals of low value and little attention is paid to their feeding and in the dry season there is a certain amount of natural pasture on the harvested wet fields. The fodder is required for the more valuable animals which are necessary for dry and garden cultivation as well as for heavy draught. The export of paddy straw from the irrigated tracts is facilitated also by the system of grain rents; the cultivating tenant often being forced to sell his straw in order to exist. The districts which are away from the coast are more liable to failure of rains and crops. The Ceded districts, however, do not require many cattle for purely dry cultivation. A pair of bullocks are sufficient to sow 30-40 acres, and it is a very bad season, when this area cannot supply more than sufficient fodder for these. In recent years, moreover, the extension of well cultivation has done much to ensure these districts against scarcity of fodder. So also in

Coimbatore, Salem, North Arcot and Trichinopoly, the development of well irrigation has largely protected these areas and it is no uncommon thing to see fodder cholam grown in small areas under wells for the use of milch bullocks. Mr. Sampson states that "in 1916, it was reported that the fodder supply was insufficient in Ramnad, Madura and Tinnevely districts. This was due to two causes, viz., the high price of cotton which led to the extension of cotton to the exclusion of fodder cholam on the black soils and the introduction of cambodia cotton. This latter cause was however, only temporary and its resultant effect has been beneficial both to the fodder and food supply. The cultivation of this crop has spread through the southern districts and ryots, finding how profitable is the cultivation, have grown this on their garden



STACKING HAY AT HOSUR.

lands. They have now found that to get good crops of cotton it is essential to rotate this with cereal crops. The result has been however, to put much capital into the ryots' lands, which has enabled him to improve his existing wells and to sink new ones, thus greatly extending the area under well irrigation. "The West Coast fodder supply always runs short before the end of the hot weather. Paddy which is the main crop here, does not tiller like it does on the East Coast and the straw is always scanty. Harvesting in Malabar also, is defective and often half the straw is left on the fields. Little, or no use is made of the abundant growth of hill grass immediately after the monsoon except for immediate grazing and for cutting as thatching grass. Malabar is

in a worse condition than South Kanara, as wet cultivation in the latter district is much more advanced.

The cultivation of fodder crops, as an ordinary agricultural practice, is mainly confined to two tracts, viz., the northern deltas, where sunnhetap is grown as a fodder crop after the harvest of paddy, and the black cotton soil of the extreme south, where fodder cholam is grown. In the dry lands of the northern delta districts, especially in Guntur, cholam is grown, as a first crop, mainly for fodder. Though in many places fodder crops are not grown as such, preference is given to the cultivation of cereals which give either the best quality straw or the greatest bulk. The variga (*Panicum meliaceum*) crop of Guntur is peculiar to this tract, which is so noted for its Ongole breed of cattle and is the main cereal crop grown in the second season, because, being a short duration crop, it is more certain than phyra jonna as a fodder supply. The korra (*setaria italica*) crop of the black soils of the Ceded districts is another example: the straw of this is said to be specially valuable as a fodder for the cold weather. In many places also the seed-rate for cholam is much higher than is necessary and is sown so, mainly, with the object of getting a higher yield of straw. In the Ceded districts it is a common practice to weed out, for green fodder, any plants of cholam which are not likely to develop grain.

METHODS OF BREEDING.

All over the Presidency so far as cattle-breeding is concerned two descriptions of cattle exist side by side, and this is particularly noticeable in Mysore and also on the East Coast where the Ongole breed is to be found. The first is known as Nadudana or Natudana, really village cattle, which are by far the most numerous, of a small size, compact frame and various colours; every village in the province teems with them. They constitute the bulk of the agricultural stock and are the main source of the dairy supply, such as it is. The second is termed the Doddadana meaning large cattle, and consists of the less numerous but more efficient and valuable kinds, of more uniform size and colour; they are more often used in conveying the traffic of the country than in agriculture, and are largely sold in cattle markets. Doddadana and Nadudana are particularly Mysore terms.

The whole breeding operations of this country are carried on by means of three descriptions of bulls:—

- (a) Choice specimens of Doddadana breeds, either kept in villages and hornfed, which are licensed to graze on village crops or may be kept in the herds, and freely moving with them in their jungle pastures; these may be styled special

superior bulls. A large majority of these have been dedicated to temples, and are thus held to be sacred.

(b) The calves of Doddadana bought when young and reared in villages, destined for agriculture or sale after castration, but employed as sires meanwhile. These may be styled casual good breeding sires. They are moderately good though inferior to the first named for breeding, and being permitted to cover before castration they make, it is said, less efficient agricultural and draught cattle.

(c) These may be called Nadu bulls, they are the numerous small sized and more or less ill-shaped young males of the Nadudana class herding with the village cattle; these no doubt lead to degenerate breeding; Nadudana or village cattle are left entirely to the course of nature without any control, and without any of those artificial restrictions by which alone a breed can be saved from degeneration. Seldom is any selection made of breeding cows and bulls with reference to their fitness for producing a healthy progeny. Nor are inferior and defective bulls generally castrated; and the common practice of driving all the village cattle, male and female, together in one herd leads to indiscriminate breeding.

The Doddadana embrace the Amrat Mahal, Hallikar, Ongole, Alambady or Mahadeswarabetta and kindred breeds. Cattle of this description are only owned by well-to-do ryots and breeders. These are professional breeders, but every ryot who has a little capital adds to his agricultural occupation that of rearing a few head of cattle. There are parties who keep their herds of cows and bulls for breeding purposes mostly in the vicinity of grazing hills and lowland forests. Calves of a year old or so are bought from them by the ryots, who attend them with much more care for two or three years, and exhibit them for sale to the best advantage at the cattle fairs.

In some parts however, it is the custom for one or two villages to club together and subscribe for a superior bull which is carefully selected and purchased when young. It is the common property of the villagers, and being allowed every licence, even to the extent of grazing on private fields, keeps in excellent condition. Such bulls follow the herd during the day and being accustomed to graze on rich crops, seldom pay heed to the poor grazing on the village common. They run to the field crops and graze their fill either after the herd returns home for the night or before it is let out in the morning. With the better class animals great care and attention are paid to the selection of both cows and bulls and the conditions under which they are reared afford facilities for the regulation of breeding. Cows of the *Doddadana* are kept in the villages.

they are homed and under shelter, in which case only the very best bulls are secured for serving them. Each herd has its own special superior bull sometimes selected from the same herd, but more often from some other herd to prevent in-and-in-breeding. As the bull grows old and deficient in vigour, a young bull is similarly selected and kept in the herd to take its place. The young one in many cases only acts the part of a teaser. No sooner does it perceive symptoms of a cow being in heat than it approaches, and then keeps constantly attending on it. The skittish habit of the cow, being tired of the importunity, seeks protection of the elder bull which the young one dare not approach and which then serves the cow.

In the Ongole breeding tract the majority of the breeding bulls are Brahmini bulls. They have a free range and roam over the country side. The origin of these bulls is somewhat interesting.

Brahmini bulls.—The tradition is that one of the early Hindu kings in the course of his travels saw what poor specimens the herd bulls were, and having given this matter much thought he decreed in honour of *Siva* and of *Nandi* the bull, who was the vehicle of the God in his peregrinations that all well-to-do persons should, on the death of a relative, select the best bull-calf they could find, and present it as an offering to the God. These animals thus became the property of the community, and were allowed to roam and feed where they liked, and became the sires of the village herds.

As far back as 1909 Lt.-Col. Gunn, Superintendent of the Indian Civil Veterinary Department, Madras, stated in his book that persons bought the cheapest young bull they could find, as a salve to their conscience, and presented it to the deity to be eventually turned loose into the herd as a future sire and this probably accounts for some of the poor bulls which are to be seen everywhere among the village herds.

Brahmini bulls are bulls which have been dedicated to the temple. A well-to-do influential man dies in his village and his relatives wish to commemorate his name: therefore they dedicate a bull in his memory. In former years great care was exercised in the selection of this bull, a committee of leading cattle-breeders and ryots was appointed and they paid very special attention to each of the 32 points which they considered a good breeding bull should possess. A number of good and promising bull calves were brought to the village, immediately after the death of the person and the committee discussed the good and bad points of each animal, and eventually selected the best. The selection was very rigid and no one questioned it, once it was made; the price was also fixed by this committee, and this was always accepted. The

young bull was branded at the funeral ceremony of the deceased by the priest, and then it was set free to roam about wherever it liked. The animal was allowed to enter any field of growing crop, and it was considered a sin to drive it away. Should it enter the farmstead, the ryot usually fed it until it departed. At the present time, the selection of a bull has developed into a mere formality, and has led to a lot of quarrelling; no importance is attached to the selection. Due to this and the high price demanded for a good bull-calf, the relatives of the deceased now usually select a bull-calf from the deceased's own herd or purchase a cheap animal and dedicate it. It is evident that this practice is growing. In some places the ryots drive off the breeding bulls from their growing crops and consider them both destructive and a nuisance. Owing to the high price of foodstuffs, the donors of these bulls are criticised instead of praised and they generally have to take charge of and stall-feed them during the time the crops are on the land.

Once the animal is branded as a bull, it is impossible to dispose of it; it is considered very sinful to use it as a work animal or to have it destroyed.

In many districts, it is customary for the bull to run with the herd; this is not advisable as the bull serves the cow repeatedly until both the cow and the bull are exhausted with the result that the cow may not prove in calf and the bull becomes unfruitful at an early age. Double service exhausts the bull to no purpose, endangers its fruitfulness, reduces his condition and constitution, diminishes the number of individual cows he can serve in one season and consequently the good he can do in a district. It is much better to station the bull under control in the village in charge of a responsible person.

It is not advisable to keep the same breeding bull in a district for more than three or four years, otherwise, in-breeding takes place. In-breeding controlled by an experienced person is alright under certain conditions but if left to the ordinary village cattle-owners, it would lead to unprofitable results, such as weak progeny, barren heifers and impotent bulls.

In the Vizagapatam district several of the owners of proprietary villages now keep breeding bulls of the Ongole type and some excellent stock bred from these are to be seen.

In the Kangayan breeding tract there are no Brahmini bulls and conditions are very different to those in the Ongole tract. The big breeder has many advantages over the small breeder. He has large grazing areas, and his herds are sufficiently large for him to be able to divide them up according to age and sex. All breeding

bulls are private property and are owned by big breeders, most of whom do not allow petty breeders to have their cows served by them unless the offspring are sold to the owner of the bull.

In recent years the Coimbatore and the Salem District Boards have taken an interest in cattle-breeding and have purchased good breeding bulls and stationed them in various parts of the districts; Co-operative and Agricultural Seed Societies and Village Panchayat Boards have also purchased breeding bulls for the benefit of their members, they are housed in a central village and cows are taken to them for service and a small fee is levied. Most of these bulls are entered in the Madras Government Bull Premium Scheme and the owners receive a grant of Rs. 90 per annum for 3 years, provided that the bull is well-housed, maintained in good breeding condition and serves not less than 40 cows per annum. A prize of Rs. 5 is awarded for the best bull calf and the best heifer calf born in the year to the bull.

In the southern districts, except in a few isolated places, the practice of dedicating bulls does not now exist, and dependence has to be made on young uncastrated bulls for the reproduction of the species.

In other parts of the Presidency, very little care has been devoted to cattle-breeding. In the Madura district there are a few Brahmini bulls but the best types of bulls in this district are reared and kept mainly for "Jellicut" or Bull-baiting purposes. Private individuals are now maintaining good breeding bulls in this area under the Bull Premium Scheme.

Cattle-breeding on the West Coast has been neglected and all the animals are very small in size and barely yield enough milk for their calves. Lately private individuals, village panchayats, etc., have purchased Scind Bulls and stationed them in villages in order to grade up the size and improve the milk yield of the breed.

In the Tanjore delta land-owners and large ryots maintain breeding bulls in order to encourage small cattle-owners to send their cattle for grazing on their paddy lands to produce manure; the services of the bull are given free and the ryot with a good class bull always attracts the largest number of cows for grazing on his fields.

BREEDING AND REARING TRACTS.

Breeding tracts.—These are described under the various breeds which follow.

Rearing tracts.—These are probably as important as breeding tracts. In fact, they may be regarded as stepping stones to cattle

breeding and there is no reason why, if the necessity arises they should not be converted into breeding as well as rearing tracts; and in many parts of the country, this necessity is already arising. Public grazing is becoming more restricted and at the same time cultivation is becoming more intensive and the ryot has to depend more on his own resources for his manure supply. The garden land cultivator requires plenty of manure, therefore it is necessary that he should keep more livestock than he actually requires for working his own lands and there is no reason why he should not keep one or two cows and rear his own young stock. Well-bred and well-fed stock always realize much better prices than ill-bred and poorly-fed stock and this is noticeable in the Coimbatore markets.

There are considerable movements of young stock from the breeding tracts to the rearing tracts, some of these are reared for sale, as in Vizagapatam district and others are reared for the ryots' own use, as in the Ceded districts.

In the Northern Circars, the littoral of the Vizagapatam district, including the Chicacole taluk of the Ganjam district, is the great cattle-rearing tract and it seems that, within recent years, certain amount of regular breeding has been carried on. Young male stock are brought up here by dealers from the Godavari, Kistna and Guntur districts and sold, either in the villages or in the markets. Rearing is carried on by all classes of petty ryots. The ryots use these young stock for dry cultivation on light soils and thus, after the first year, the ryot's working bullocks cost him little or nothing, since, as they grow, they are all the time increasing in value. By the time these animals are fully grown, they are broken into work and find a ready sale among the more wealthy ryots of the deltas. The Vizagapatam ryot is noted for the care, which he takes in feeding his young stock and there seems no reason why, in time he should not become a breeder, as well as a rearer. In a few proprietary villages some Brahmini bulls of Ongole type have been dedicated. More wells are being sunk in this district and the cultivation is becoming more intensive, thus more manure is required for garden cultivation and it is hoped that this will lead to a system of mixed farming. Besides the rearing of this type of heavy draught cattle, very large numbers of the ordinary cattle of the Vizagapatam district are sold annually to the Godavari delta ryot who prefers these, although they cost more, to the semi-wild cattle brought down from Bhadrachalam.

The whole of the black cotton soil area of the Ceded districts may be regarded as a rearing tract. Young bulls 1-2 years old are regularly imported every year by Nellore dealers and these are bought and reared by the black cotton soil ryots for their

own use. It is unlikely, however, that cattle-breeding will ever develop here.

In the west of Bellary district, Mysore bull calves are brought in large numbers and are reared by ryots of this tract. This profession is said to be steadily on the increase.

Punganur and North Salem form a large cattle-rearing tract. Young stock of the Mysore and Alambady breeds bred in the forests are purchased from dealers for rearing. This area supplies mhothe and cart bullocks to many districts.

The whole of the Coimbatore district may be regarded as a rearing tract. The big breeder always rears his bullocks, besides this there are many villages throughout the district where cattle rearing is a regular profession. The people of Thottiyar caste are nearly all rearers of cattle, they break them in to work on their own lands and then sell them. The animals are almost entirely handfed, grass and fodder, when available, are collected daily from the cultivated fields, after which they are fed with straw, etc. For some two months before sale, they are given concentrated food such as oil-cake or cotton-seed. In South Trichinopoly and North Madura cattle-rearing is fairly common. Young stock from South Coimbatore and Karur taluk of Trichinopoly are brought here but the demand depends on the amount of grazing available after the rains of September-October. A little rearing is done by villages around Dindigul and some people of the cool agricultural class in the Tanjore delta. This extension of cattle-rearing seems to point to an increased demand for better class stock.

A poorer quality of cattle are reared in South Malabar. During the dry season November-April-May young stock are imported into this district from Tudyialur and Pollachi shandies, besides these, young male buffaloes from 2-3 years old from Trichinopoly, Salem, and Coimbatore districts are sold at Pollachi to the West Coast. Some Malabar dealers purchase young stock in the big fairs of Dharmapuri for sale to the ryots in the southern taluks of Malabar and also Cochin and Travancore State. These animals, if bought early enough, are grazed on the abundant pasturage, which springs up after the monsoon, while, later on, grass is collected and fed to them. During the hot season they are fed on paddy-straw, etc., and when the cultivation season commences they are used for light work. When they cut three to four pairs of teeth, they are taken to the markets and sold, thus, the cost of rearing is practically nil, while they serve as work-cattle for light work. Buffaloes are reared in the same way. In many amsons around Kizhur, cattle-rearing is carried on on a more extensive scale. Older and better animals are bought and are sold after a year or two.

ONGOLE BREED.

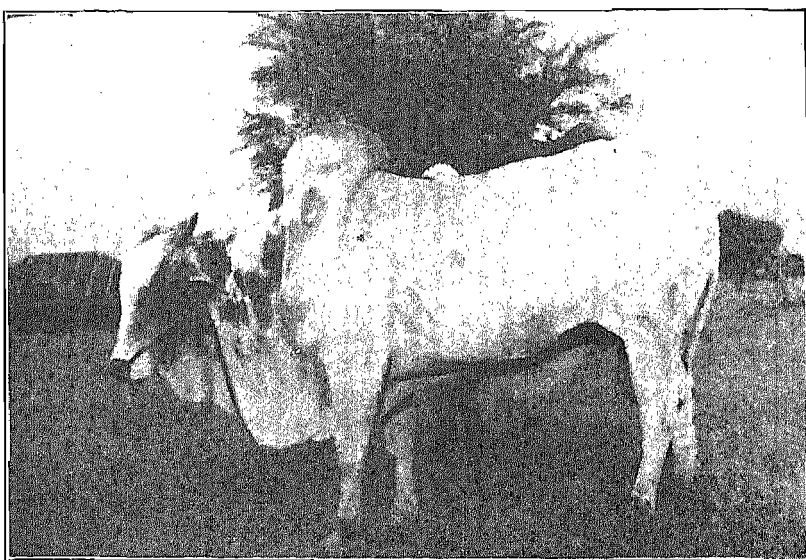
This breed is frequently called the 'Nellore' breed, the reason for this being that formerly the Ongole taluk was included in the Nellore district, but now it is included in the Guntur district; therefore the cattle should be given the correct name of "Ongole" the tract from which the best specimens of the breed are to be obtained.

It was formerly noticeable that cattle-breeding received most attention in those parts of the country where circumstances of one kind or another were adverse to the extensive prosecution of agriculture. The cultivators were repeatedly deprived of the results of their labour, and were consequently considerably harassed; they, therefore, as a substitute devoted their time to raising large herds of cattle of a superior kind which were then much in demand, and which they saved from the grasp of the officials by moving them from place to place. Under more secure Government these cattle-breeders settled down, and being a fairly wealthy class, retained their pride in the fine cattle in their possession, with the result that many beautiful specimens were seen in this part of the country. The very best examples are to be found in the villages of Karumanchi, Nidamanur, Pondur, Jayavaram, Tungtoor and Karavadi in the Ongole taluk, and in Elapalapadan Nennurpad and the hamlets along the banks of the Musi in the Kandukur taluk. Fine cattle of this breed may also be found in the taluks of Vinukonda and Narasaraopet. In the southern part of the Nellore district, where wet crops are grown, the cattle are much inferior not being so well cared for or fed as in the places above named.

The system of feeding observed by the ryots of the different parts of this country naturally depends upon the extent of pasturage. In the low-lying parts where paddy is principally grown a certain portion of dry land is often kept as a pasturage for cattle. Most of the cattle however, leave the villages during July to October—the southern rainy season—and are sent to the western taluks where there are extensive wastes and jungle tracts. Part of the working cattle will occasionally follow the other cattle during November and December, should the pasture land of the village not be sufficient. The ryots often clubbed together and sent their cattle away in large herds. Should the North-East monsoon be favourable and extend till late in the season, the cattle are only pastured until January when the paddy is harvested, after which there is very fair grazing.

Private grazing areas have decreased and now most of the cows, etc., are sent to the distant forests for grazing.

The breeding tract.—The finest specimens of this breed are to be seen in the villages lying between the Gundlakama and Alluru rivers in the Ongole and Kandukur taluks. These, however, are not all necessarily bred here, and fine animals can be found, throughout the dry taluks of the Guntur district, as well as in the Kandukur and Darsi taluks of Nellore district. Many of the finest animals seen on these alluvial soils have been brought in for rearing from other parts of the district. One sees here cattle which have come from Bapatla, Narasaraopet, Guntur and Vinukonda taluks, and there is little difference to be seen in the quality of these animals, and those born and bred in the alluvial villages.



ONGOLE BREEDING BULL NO. 125, CHINTALADEVI.

It is, however, possible for the people who know the local breeds to be able, often to locate the tract from which an animal has come, thus showing that there are variations in the breed even within limited areas. The same type of cattle are to be found throughout the Nellore and northward throughout the dry taluks of Kistna and South Godavari but, though the type remains, the quality, size and bone of the animals deteriorate, especially southwards as one gets further from the centre of the breed, viz., Ongole. The reason for this is almost certainly due to the large quantities of the lime found in the heavy soils of Guntur, which tends to form bone and sweetness of pasture.

Breeding conditions vary considerably throughout the breeding tract south of Kandukur. The former will be described first,

though even here, conditions vary greatly with the fertility of the soil. In the alluvium of Ongole taluk, there are no large breeders. Even the biggest ryots of the best known breeding villages do not own more than 10 to 12 head of cattle, including their plough bullocks, and it is only when one leaves this, and gets on to the shallower black soils, such as are seen in and around Kandukur and Addanki, that one finds ryots who own herds of up to 50 head of cattle. It is a noticeable fact, however, that the small breeder pays much more attention to his animals than the bigger breeder both in the matter of breeding and feeding; in fact he often errs on the side of over-feeding and pampers the animals, bringing them to early maturity. Early maturity in males is not required in India,



ONGOLE BULL, NO. 20.

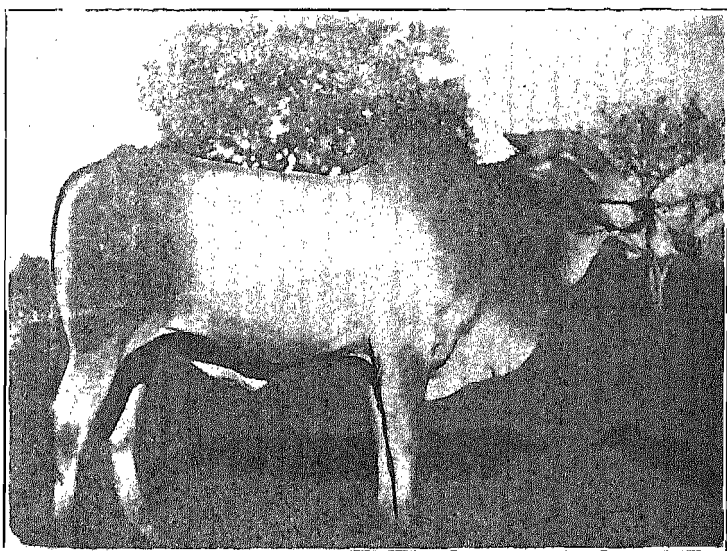
as in Western countries since the stock here are required for draught purposes, and must be properly developed, if they are to stand the strain of years of work. For grazing, ryots have to largely depend on their patta lands, and about one-sixth of the patta lands of the Ongole taluk were left fallow for pasture. The proportion, however, varies very considerably with the fertility of the soil. On the alluvium, this is very limited and the bulk of the pasture is permanent, being patta land which is liable to wash, and which is usually too much cut up by rain water to allow of cultivation. Off the alluvium, although permanent pasture was common

on similarly cultivated lands, temporary pasture is much more common, and cultivated land is left fallow to grow babool and grass. No effort is made to lay down pasture, except that goats are folded at the proper season in order to sow babul seed. Excellent pasture springs up naturally and very rapidly. This consists mainly of the following herbage "*Chengali gaddi*" (*Iseilema wightii*), 'Gohadagaddi' (*Andropogon monticolata*). 'Nanamala gaddi' (*Andropogon caricosis*) as well as leguminous plants, such as *Indigofera linifolia* and *phascolus trilobus*. Chengali gaddi is by far the best grass and is common throughout the Northern Circars on heavy soils retentive of moisture. It is well known everywhere for its excellent feeding quality. Nanamala gaddi is a coarse grass which seems only to be eaten when more succulent pasture is exhausted, and is useful in making the grazing last out. Temporary pastures are left down for 7-8 years, i.e., until the babul trees are sufficiently grown to be of use for agricultural purposes. Permanent pastures are presumably held largely on joint patta; for on these several small herds of cattle are usually seen grazing, each in charge of their own herdsman, nor is that care taken of these pastures, which one would expect, if they were singly owned. Prickly-pear and other useless shrubs are allowed to remain and occupy a large part of the area, which would otherwise be available for grazing, while all cattle droppings are scrupulously carried away, to be made into bratties (Dung cakes—*amliq*) in the village. In addition to grazing, all animals are fed with grass, etc., collected from other cultivated fields. This practice is common throughout the northern districts, but nowhere is it so largely practised as here, especially on the alluvium where pasture is reduced to a minimum compatible with cattle-breeding. The chief fodder for the cattle consists of jonna straw, the main south-west monsoon crop, the variga (*panicum milcaicum*) straw, which except for a slight admixture of "*Pyrri jonna*" (*Andropogon sorghum*) is the only dry land cereal grown in the north-east monsoon. In addition to this, the leaves and threshed pods of horsegram and other pulses are carefully stored. The greatest possible care is taken to collect all of this, the fields often being swept so that none of the fallen leaves should be lost. It can thus be seen that the cattle on the poorer black soils lead very much more natural existence than those of the alluvium. Grazing lands are much more extensive and not so much hand feeding, which means tying up, is necessary; while the crops being poorer, not so much care is taken to remove all the straw and leaves from the fields, nor is grass assiduously collected. Thus, besides their more extensive pasture, the poorer cultivated lands afford considerable grazing for the cattle after harvest. In many of the breeding villages on the alluvium, young stock are entirely handfed and never get any exercise unless they are taken to be

washed. This tends to make the animals slow and clumsy. Cattle which lead a more natural life, though they do not mature so rapidly, are much quicker and have much better feet. As concentrated food, the young stock get the by-products of the pounder,

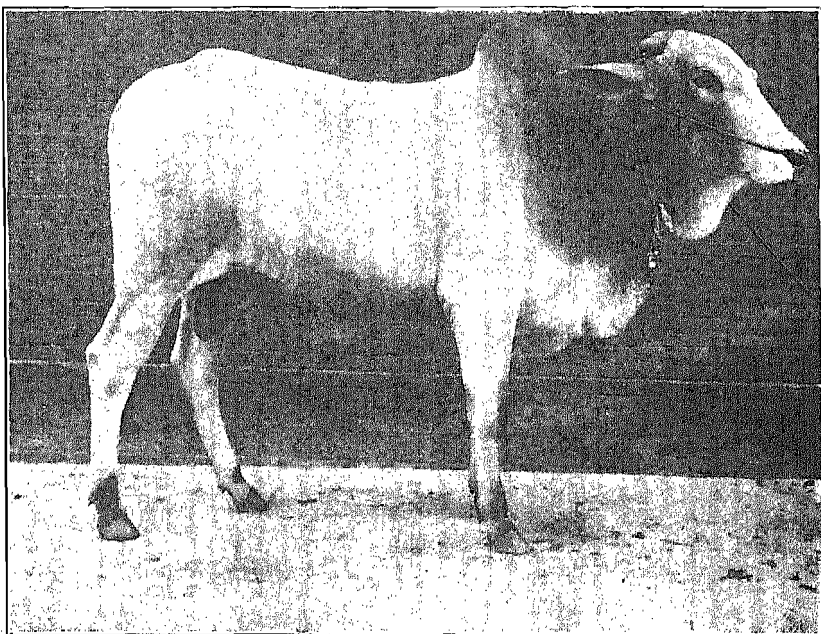


ONGOLE BULL NO. 14.



ONGOLE BULL NO. 6.

such as the husks of pulses and the bran of cereals as well as the rice water from the house. Since none of the pastures are fenced, animals have to be brought in every night. During the cultivation season they are usually kept tied in the cultivated fields, where temporary shelters are built for them and their owners. At other times they are taken to the village, where they are well-housed often in separate substantial cattle-sheds, which are kept scrupulously clean.

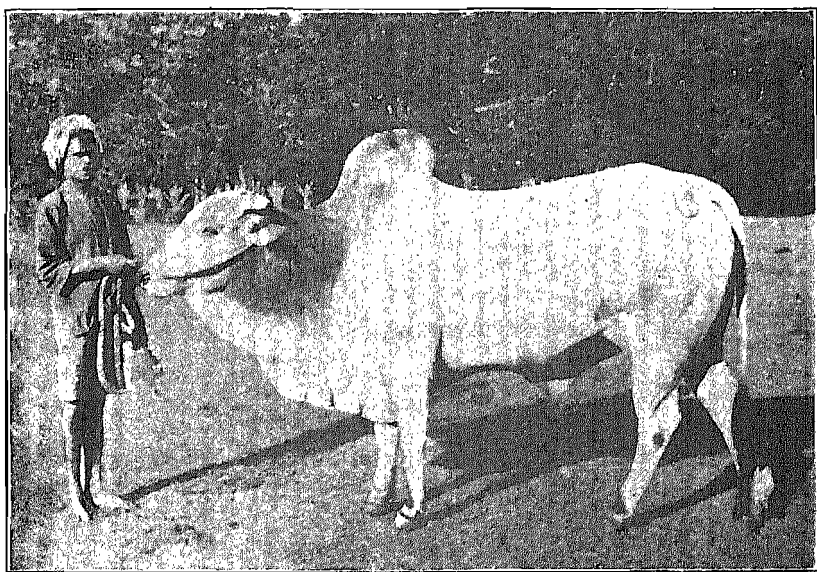


ONGOLE BULL, 2 $\frac{3}{4}$ YEARS.

The major portion of the soil in almost all the taluks is heavy black soil. Jonna grows well here, the straw of which forms the chief bulky cattle-food. The tenacity and the strong bone in the Ongole cattle can safely be attributed to the jonna straw and the available lime in the heavy black soils of Guntur. Climate and rainfall have no doubt an influence over the constitution and susceptibility of cattle, but the Ongole breed thrives on the black soil in this dry and hot climate. On the hill slopes of Palnad or Nallamalais where the soil is red, it is found that the cattle bred and reared, do not reach the same standard and finish as those bred and reared on the black soils.

The district is benefited by both monsoons usually in an average rainfall of 29.5 inches. With the advantage of such a retentive

soil, cereals, pulses, oilseeds, cotton, etc., are grown and good grasses from porambokes and pastures are obtained. The straw of cereals and bhusa of pulses together with horsegram, cotton seed, etc., provide food for the cattle, the grains of cereals providing food for man. In former days these foods were in abundance and good cattle were bred and reared but owing to a change of conditions, the growing of these crops has decreased and their place has been taken by commercial crops such as tobacco, groundnut, chillies, etc. Formerly more interest was taken in cattle-breeding, especially in the Ongole tract, and the average ryot's holding was

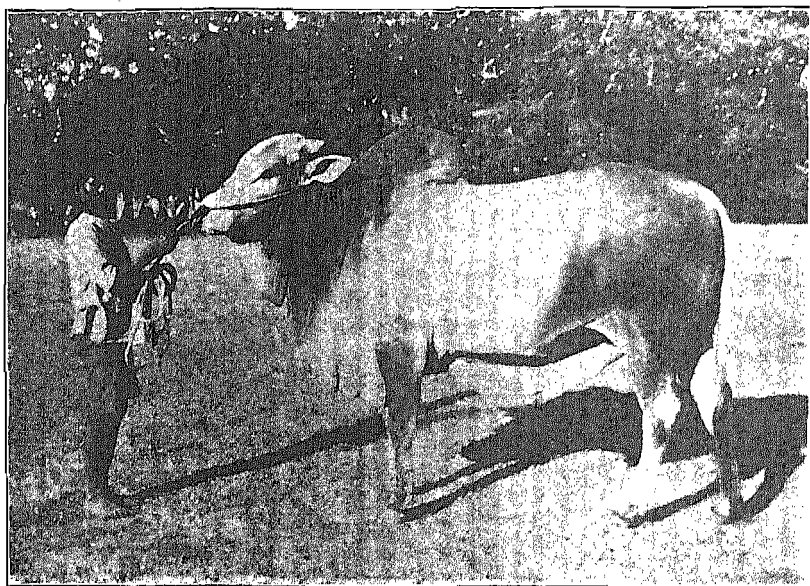


ONGOLE BULL, VIZAG TYPE.

about 4 times the size of the present one, he formerly set apart about one-fourth of his holding for grazing each year and this portion was not taxed. Every village had enough unassessed waste or poramboke attached to it, besides vast areas of unreserved forests for grazing.

Now, with the increased population, conditions have changed, more holdings became necessary and consequently grazing areas and pasture lands were broken up and turned into cultivated areas. The present day ryots in this district are in need of money, therefore they devote more attention to the growing of commercial crops and less attention to the growing of fodder, except in rare places. They have reduced their area under cereals to such an extent that they grow only sufficient grain for their requirements

and straw for the work-cattle. In Ongole taluk the grazing land is chiefly river banks and land adjoining which cannot be cultivated with crops owing to risk of floods.



ONGOLE BULL NO. 26.

To give some idea of the methods of farming in this tract in former days and the present, I have taken a holding of 50 acres : in former years the cropping was :—

- Twelve acres fodder cholam mixed with gram,
- Five acres kora sajja followed by horsegram,
- Fifteen acres variga and pyru jonna,
- Five acres pyru jonna,
- Two acres maize, and
- Eleven acres pasture,

the cattle maintained on a holding of this size being roughly as follows :—

- Two pairs work cattle,
- Two or three cows,
- Two or three buffaloes, and
- Three calves.

The surplus grain in good seasons such as sajja and gram would be sold. All the fodder would be utilized by the ryot in feeding his stock.

At the present time, if we take a holding of this size, we find it cropped in this way :—

Six acres jonua,
Four acres korra and sajja,
Two acres pillipesara,
Fifteen acres variga and pyru jonua,
Five acres pyru jonua,
Two acres maize,
Ten acres chillies, coriander, tobacco, groundnut, and
Six acres pasture.

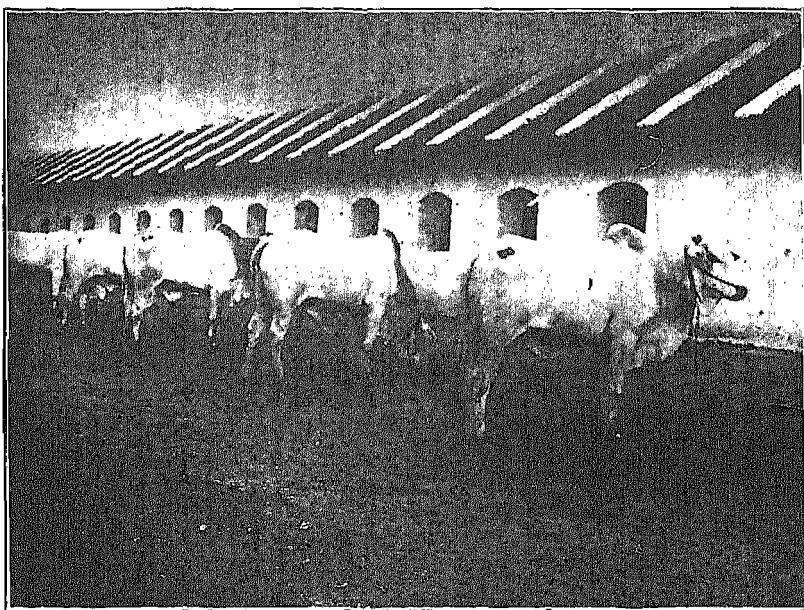
Of these, practically the whole produce of 10 acres is sold away and the ryot is short of 5 acres of grazing land and 6 acres of fodder crops, this roughly is 50 per cent of his grazing land and 15 per cent of fodder growing land. The ryot has slightly reduced the number of his stock, but he still maintains more animals than his holding will carry, and he does not purchase any fodder to make good the deficiency, hence the quality of the present day-stock is not so good as formerly, in this, the chief taluk of the breeding tract.

The ryot of the tract with ages of experience is quite competent to judge good and bad cattle from the external conformation and he knows quite well the benefit of having a good bull for stud purposes. He understands the feeding of stock and some of them are experts in cattle-breeding; otherwise the breed could not have been brought up to that stage of excellence in which it stood about 20 years ago.

The Ongole breed is the chief breed of Southern India; it is a dual purpose animal. About 30 years ago the average ryot used to maintain from 4 to 8 cows but taking the whole tract into consideration he maintains one or two at the present time. Almost every village had one or two excellent bulls and every important ryot possessed a good bull of his own, nowadays most of the bulls are Brahmini bulls. At the present time, the number of breeding bulls is much below requirements. The Brahmini bulls lose condition in the summer months for want of enough food. Young bulls are not castrated until they are broken for work, i.e., about 3 to 4 years old and several cows are very often covered by these uncastrated bulls. It is difficult to select a really good stud bull nowadays.

The majority of the cows are ill-fed and naturally in very poor condition and their progeny suffer and a deterioration in the breed is seen. Owing to the change in conditions in the production of fodder and in the area of the holdings, most of the interest in the cow is lost; only well-to-do ryots can afford to maintain them properly and a certain class of "Malas" in Ongole taluk who are

professional rearers and they rear animals for the Madras Milkmen. The cow generally gets the remnants of straw from the mangers of work-bullocks. She generally conceives for the first time from 4 to 5 years of age instead of within the third year and calves about every two years or so after this. She yields about 7 to 8 lb. milk over a lactation of 250 days and generally becomes barren after 4 or 5 calvings. Most of this is due to poor feeding. The ryot is aware of this fault and says that circumstances do not permit him to feed the female stock but yet at the same time he feeds his she-buffalo well. The woman of the house looks after the buffalo and she makes a small income out of this by selling ghee and curds. In fact the buffalo is unnecessary, if the ryot would feed



YOUNG ONGOLE BULLS AT CHINTALADEVI.

his cow with the food which the buffalo consumes, it would improve in condition, breed more regularly and the milk flow would increase and in many cases, the cow would provide sufficient milk for the ryot's domestic use and also enough to feed the calf.

During the crop season, i.e., from the middle of June, cows, heifers, buffaloes and young stock are sent in charge of Lambadies to forest grazing areas like Palnad, Sattanapalli, Vinukonda, etc., for grazing. During years of good rainfall when plenty of grass is available, they return in a better condition in January; otherwise, they lose condition.

Most of the cows in this tract come to heat in two periods—February to March and August to September or October. This probably is due to the good grazing in the fields or forests just previous to the above periods after the crops are off the fields and after the monsoon respectively.

When the cow comes to heat in the village, the ryot tries to obtain the best bull available, but lately due to the scarcity of good bulls, he gets his cow served in some cases by a young and immature bull. When the cows are grazing in the forests, the want of a good bull is badly felt and here it is where promiscuous breeding takes place, as all the cattle including young bulls of other breeds graze together.



ONGOLE BULLOCKS.

The system of rearing calves has not changed very much, all the milk from the dam is allowed for the calf. In most cases cows do not yield more milk than is required for the calf. Close to towns where cow's milk is in demand, cows having heifer calves are milked, but in the towns themselves, both bull and heifer calves are neglected and ill-fed. In the villages the bull calf receives much better attention and feeding than the heifer calf, that is, provided it is an average calf, unpromising ones do not get much attention. After weaning, the bull calf is given good fodder and a little concentrated food daily whereas the heifer calf is allowed to feed for itself and picks up what fodder it can from the refuse, etc., left by the work-cattle. This is because the ryot expects to rear a good bull or work animal which might realize a fairly good price.

Female stock are very much neglected and usually have to take the last place. For instance a ryot devotes his special attention to his work cattle, next to these come his bull calves which he is rearing and after these the cows with bull calves and last his dry cows and heifers.

Although the breeding bulls roam about freely, the ryot usually knows when his cow has been served and by what bull.

Heifers do not attain maturity until 4 to 5 years old. After calving, the cow is kept at the homestead and if the calf is a bull, special attention is paid to the feeding of the cow, a little green fodder and concentrates are given if available. The cows are generally in a poor condition at the time of calving and only pick up on the good feeding afterwards.



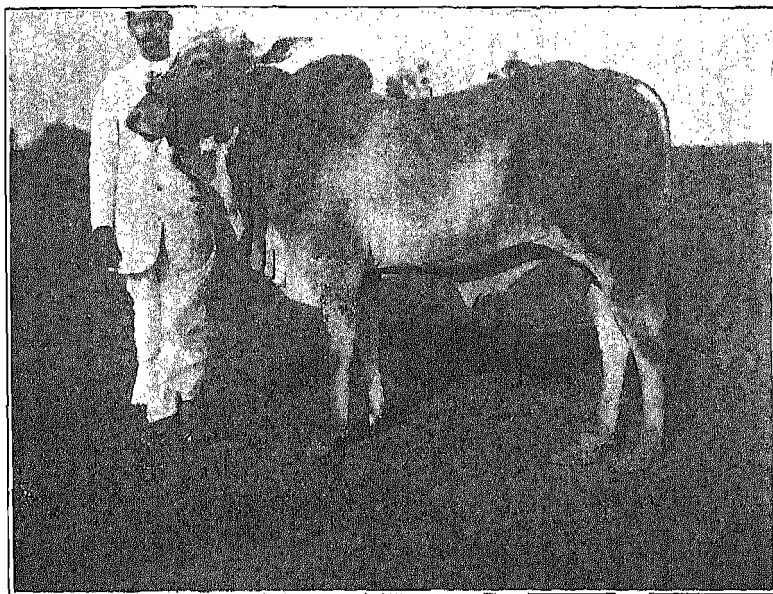
ONGOLE SUCKLING CALVES.

These cows with calves are generally sent out in the cold season in the middle of the day, and in the hot season in the morning and the evening, the animals remaining in the shed the rest of the time. The calves are allowed to suckle twice in the day. In a normal year, they get fairly good grazing from January to April. From May to June they are given dry fodder and during July to September they are given grass scraped from the fields and roadsides. From October onwards they get a little green fodder from the early crops such as jonna, pillipesara, etc.

In Ongole and some parts of Bapatla taluks, the cattle are tethered in the open fields for manurial purposes when there are no crops on the land. A small temporary shed or pandal made from redgram and cotton stalks is erected in the fields to give shelter to

the animals during midday. At other times the animals are kept in the villages. In some places the cattle are housed in cattle-sheds in the villages.

In Ongole district bull calves are given some soft green grass after about 40 days old and a month or two afterwards some good green fodder if available. Sometimes a little grain, such as cholam is ground up, boiled in water and then fed. After weaning, jonna and horsegram which is pounded and made into a paste is given to calves along with water in the form of thin gruel twice a day. If the quantity is limited, the calf is only fed once a day at 3 p.m. At 20 to 24 months the young animal is trained for work and at



ONGOLE BULL, 20 MONTHS OLD.

the age of two and a half years, light work is given and this gradually increases until the animal cuts its second pair of teeth. Most of the grain consumed is produced on the homestead and it is very rare that the ryot purchases grain for this purpose. Young bulls are muled generally between 3 and 4 years of age.

From December to May dealers from outside districts visit the villages where breeding is carried on and select good bull calves required by them. They are then taken to the Ceded districts and sold to the ryots generally. In their new homes they are well cared for and given special attention, the result being that they attain a very big size.

Heifer calves can be divided into two classes—

- (1) Local breeding stock.
- (2) Dairy heifers.

Number (1) has already been described: there is no special care bestowed on this class.



ONGOLE BULL, 10 MONTHS OLD.

Dairy heifers.—These are generally reared by a poor class, chiefly 'Malas,' who are usually the field labourers and weavers as well. They select one or two promising heifer calves from the ryots' herds, two or three months after they are weaned, generally at the age of about twelve months. The system of purchasing is usually that the Mala selects a calf and either purchases it outright, or on stipulations such as face value plus a certain amount of the profit when the animal is sold, or a certain amount of work by the family has to be done at the cultivation period for the ryot. The calf is reared carefully and generally attended to by all the members of the family, the number of calves reared depending on the size of the family. The women collect grass in their spare time or obtain fodder from the ryot as part wages whilst returning from work. A sufficient quantity is collected and stored in the harvest season when they assist the ryots in harvesting. This is supplemented with grass which is collected. It is fed in small quantities regularly along with the washings of the kitchen and some 'Variga-Pottu' (grain husk). The heifers come to heat through good and regular attention from the age of 30 months and

upwards. Promising animals pass through several hands with a little profit to each. As soon as the Mala sells, he goes and purchases another animal with the money. In some cases people walk many miles in search of a good heifer. When the animals are nearing parturition, they are purchased outright by dealers and when a sufficient number are procured, they are sent to Madras as milch animals. Some of these, after they go dry in Madras, are sent back to this district to be maintained until they calve again. The maintenance charges are Rs. 6-8-0 per month and a gift of a turban or a cloth to the Mala when the animal calves and is taken back.

Fodder.—The chief fodders grown are jonna, sunnhemp and some pulses. Jonna is grown pure or mixed with sunnhemp *for fodder only* by some well-to-do ryots in Ongole and Guntur taluks. In others the crop is sown pure or mixed with sunnhemp at a high seed-rate in July or August and is cut and fed green till about the end of December. If, however, the rains are good, and the crop looks promising, the ryot allows it to seed for grain: otherwise he cuts it and converts it into straw. It should however be noted that this practice is adopted only by well-to-do ryots, as in most cases the crop is sown pure or mixed with a pulse for grain and the straw fed to cattle.

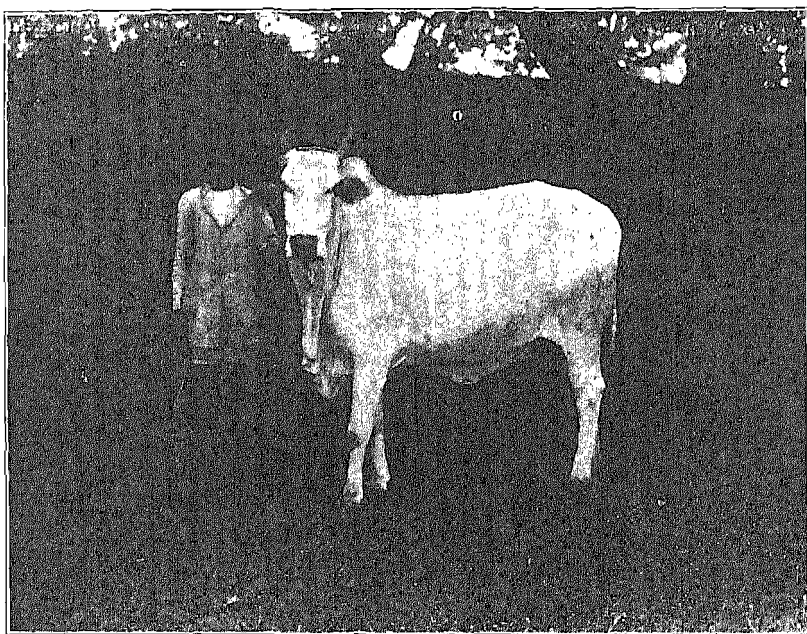
In the delta tracts, sunnhemp is sown for fodder following paddy, this along with paddy straw is purchased by dry land ryots in large quantities. In bad years of scanty rainfall one can see thousands of cart-loads of paddy straw transported from the delta areas to the dry tracts. Paddy-straw is less nutritious than jonna but the ryot buys it because it is cheaper.

Amongst pulses, the chief crop grown for fodder is pillipesara, this is grown pure and also mixed with jonna throughout the tract except Vinukonda and Darsi, where it is not common. This is considered a very valuable foodstuff for milch cows. In the Ongole taluk, cowpea is sown early in the season and after a cutting is taken for fodder, the crop is allowed for grain. Besides the above, the straw of sajja, korra, ragi, variga and arika form the bulk food for cattle. Variga straw is said to give a soft shining coat to the animal. Bhusa (leaf, pod, etc., of pulses) is preserved carefully and fed during summer. Kollagaujern which is a succulent creeper with milky pods is grown purely for fodder in very small areas in Bapatla, Guntur and Narasaraopet taluks; it is an exhaustive crop, therefore it is grown in very small areas by some well-to-do ryots. It is said to be very good for milch cows and puts a fine coat on the animal.

A few rich ryots still maintain small grazing areas on their holdings, work-cattle and young bulls are grazed in these but very little care is bestowed on their cultivation. Black babool trees are

found in these pastures, they provide shelter for the animals during hot days and also strong timber for repairing implements, etc.

The area under village poramboke which the ryot has enjoyed from time immemorial is being reduced to a very large extent and he finds it necessary to send his cattle into the forest grazing areas during the crop seasons.



ONGOLE COW No. 32.

Best yield 3,972 lb., Daily average 12 lb.

Dam of cow No. 95.

Most of the animals are sent in one or two batches early in June to the forests to graze, they are left in charge of "Lambadies" or graziers, who are a class of hill tribes. They are paid at the rate of 4 annas per month per head of cattle for grazing, the ryots paying the grazing fee of one rupee and the penning fee of four rupees per hundred animals to the Forest department. The cattle are penned at night in a penning area, and this is usually near a tank. When the water in the tank becomes dried up, the graziers move to another area, where there is water and another fee has to be paid to the Forest department. The manure collected in the penning area is deposited in the open close by, and in some

instances in the penning area itself, and the Forest department dispose of it. The penning places are not kept in a clean condition by the graziers.

Breeding conditions in Nellore district are absolutely different to those in Guntur. Here curiously enough the principal breeders live in the wet villages on the Pennar delta. This is one of the few cases known in the Presidency where wet land ryots take any interest in cattle-breeding, and the interest taken here is purely for the sake of profits obtained from this branch of agriculture; for, in their own wet cultivation, this breed of cattle are very little used. Only inferior male stock which cannot find a sale are used while the bulk of the ploughing cattle in these wet villages are, either buffaloes or what are known as 'Badhrachalam' cattle, cattle brought down from Badrachalam and the Nizam's Dominions. The young Nellore bulls, which are bred locally are sold as yearlings to Nellore dealers, who take them through into Cuddapah for sale to the garden land and black soil ryots of the Ceded districts. The bulk of the breeding stock are kept by big breeders many of whom keep from 100 to 500 breeding cows. Most of these breeders have their own private "Kanchas" or pastures on the deltas, but these are limited in area and besides these, they either have their own pastures in other parts of the district, chiefly in Rapur taluk, or else they rent out private "Bedus" (pastures) in the inland taluks where their cattle can be sent for grazing. Thus, as one pasturage is exhausted, the cattle are moved to another and this continues until the paddy harvest, when the animals are brought back to the delta where they get grazing on the harvested fields and are handfed with paddy-straw. Dealers go round annually to these villages and buy up their yearling bulls.

Breeding bulls are dedicated in the same way and for the same reason as in Ongole. Here there are rich ryots, however, who have large herds to select their bulls from and there is not the same danger, that there is in Guntur, of inferior animals being dedicated. Here again the private pasture is the mainstay of cattle-breeding and so much are these appreciated that, large prices are paid for grazing land. No care seems to be taken here to separate stock while grazing. All are grazed together and, since it is the inferior young male stock which are mainly retained there must be a considerable amount of promiscuous breeding, which is detrimental to the herd. Every encouragement should be given to the cattle-breeding of this tract, since it supplies a large part of the Ceded districts with their heavy bullocks for black cotton soil cultivation.

In Ongole and the district, male stock are usually sold when under two years old, chiefly to Nellore traders, who take them to Kurnool and the Ceded districts. Besides this, there is, from

Ongole, a large export trade in cows or rather heifers in calf. This must be a great strain on the breeding stock of the country, since these are the pick of the rising generation of cows. It is estimated that about 2,500 Ongole cows and heifers are despatched annually to Madras for milk purposes, these are all fairly good animals and quite a number never return to the tract. The cows sent at present are said to be not such good milkers as those of ten years ago.



ONGOLE COW NO. 95.

Age 6½ years. Heaviest milker in the breed (recorded).

Milk yields.—4,260 lb. Daily average 12·5.

5,510 lb. " " 17·0.

7,191 lb. " " 21·5.

The marketing of the stock seems to be the weak point in the Ongole breeding tract. Male stock would, if reared to three years old and broken in, bring in a much better return than the selling of young stock. The rich delta ryot of Kistna and Godavari can afford to and does pay big prices for animals of this type; but he prefers to go to the Vizagapatam markets, where the best animals are brought to the shandies for sale, and where there is no difficulty or delay in suiting his requirements as there would be, if he came to Guntur, and had to go from village to village seeking what he required. Mr. Sampson states:

A good market such as this, if opened, would be a great encouragement to breeding and a much more certain source of income than many of the dry crops now grown. It would

induce the people to keep their cows in the district, it would encourage private pastures and it would supply them with their own dry land working cattle free of cost; for they would get at least one, and possibly two seasons work out of their young bullocks before these were sold.

There is no cattle shandy or fair of any importance in the tract at the present time. In 1930 the Madras Government made arrangements with the local officers and the Chairman of the Ongole Municipal Council to open a monthly cattle shandy in Ongole and if this succeeded, to reopen the annual show. The first shandy was opened on 1st October 1930 and about 150 head of stock were brought, these included 63 bulls, aged 3 to 5 years, 29 cows and heifers in calf and 23 she-buffaloes in calf, but there were not many buyers present. Owing to the rains in November and December, no cattle were brought to the shandy. In January 1931, one animal was brought; therefore the shandy eventually closed.

Heifer calves are not sold to outsiders as a rule. In Guntur and Ongole taluks some people purchase one or two promising heifer calves at a time for about Rs. 15 to Rs. 20 each, rear them with special care and sell them to dealers from Nellore and Madras when they are about 8 months in calf. In Madras they realize from Rs. 90 to Rs. 120 each at present. It is said that this trade is deteriorating for want of promising heifers, the present stock not being so good. A fair number of heifers and cows are sold to dealers from Hyderabad and Vizagapatam. Most of the cows taken for the Madras milk trade are sold away in the Tiruvottiyur market where there is almost a continuous cattle fair. When the cow is sold to the milkman, the calf is not well-fed and is kept in a semi-starved condition, most of the milk being sold. A large number of cows are sold to the butchers when dry and some, if they are in calf, are sent back to the districts to be maintained by ryots until they calve.

Surplus bull calves are sold to dealers when they are one to two years old. Some promising young bulls are reared to the age of three years and then sold for good prices. The price of an average young bull varies from Rs. 150 to Rs. 300 each, according to age, size, build, colour, etc.

Ongole Cattle Survey.—During 1927–28 a survey of the tract was made. Eight hundred and forty-four villages were visited and it was found that there were about 93,000 cows of the Ongole breed together with 789 breeding bulls of which 119 were old and useless, thus leaving 670 fit for breeding. It is assumed that an Ongole cow on the average has one calf in 2 years. After deducting 15 per cent for deaths, barren and old cows past breeding, there are

approximately 39,500 cows to be served each year. The bull is allowed to run with the herd and it probably serves the same cow two or three times during the œstrus period. If 40 cows are allowed for each bull, it is necessary to maintain 1,000 breeding bulls, whereas the survey reveals that there are only 670 breeding bulls fit for breeding; the district is short of more than 300 bulls. It was also discovered that there are 316 villages which possess no breeding bull at all, of these, 148 villages possess 60 or more cows



ONGOLE COW No. 107.

Milk yields.—1,965 lb. Daily average 13.5.

5,026 lb. " " 17.9.

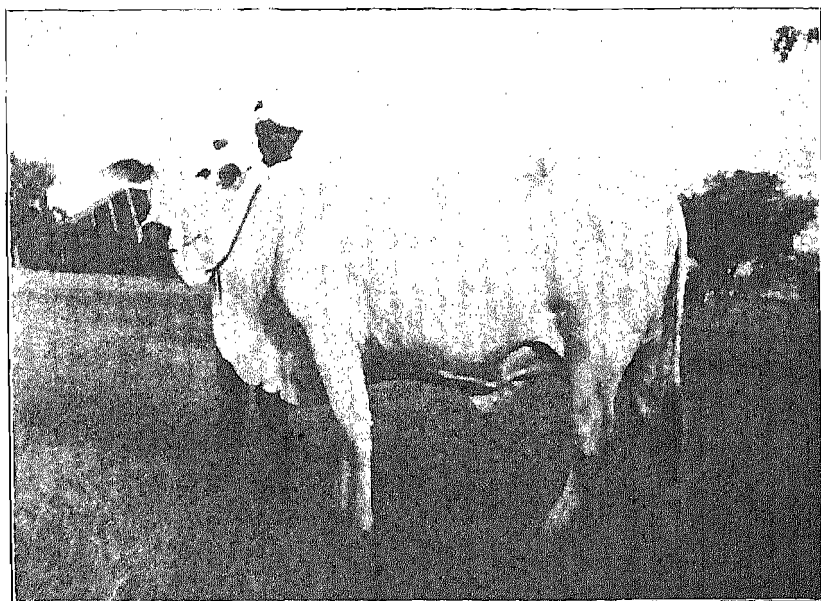
6,687 lb. " " 17.6.

Has given a daily maximum of 33½ lb. (record for Ongoles).

of the Ongole breed: therefore if the breeding of good cattle is to progress, it is essential that these villages should possess a bull of their own. Most of the services take place during two periods of the year, February to March and August to September, the bull is overworked then and it is essential that it should be well-fed and cared for if it is to prove a successful stock getter. It is reported that ryots drive away the Brahmini bull from their fields; therefore it should not be very difficult to persuade them to tie up the bull and stall-feed it in the village and allow cows to be brought to it. If such a method was adopted and the bull exercised, it would be active, services could be controlled and it would not waste its vitality in serving a cow in heat 2 or 3 times in the same heat

period; therefore many more cows could be served. Each ryot owning cattle should contribute towards the upkeep of the bull in the way of fodder and grain and the village officer or headman could supervise the maintenance of the bull. In this way, the breeding period of the bull's life would be prolonged and its services would be more efficient.

With the exception of 13 privately owned bulls, all the remainder are Brahmini bulls.



ONGOLE COW NO. 148.

Milk yield—4,890 lb. Daily average 20-6.

Particulars collected show that 42,287 calves are born annually; of these 20,610 are heifers and 21,677 are bulls; the heifer calves are not cared for and the mortality amongst them is rather high, reckoning 10 per cent for deaths, this leaves 18,650; about 2,500 Ongole cows are exported annually to Madras for milk purposes, others are sold to the dealers from Godavari, Hyderabad, etc., say approximately 1,500; this leaves 14,650 to replace deaths, old and useless cows each year. Estimating that 15 per cent of the cows die or are useless for breeding, this amounts to 13,950; therefore the number of breeding cows is just about maintained.

An average Ongole cow produces 4 or 5 calves during its lifetime in the district.

About 21,677 bull calves are born annually and it is estimated (after the requirements of the district are met) that about 30 to 40 per cent of these are sold away to dealers from other districts for work purposes.

There is a shortage of breeding bulls in Ongole taluk, which is the centre of the main breeding tract; the number of cows to each bull works out to 216, assuming that a cow calves once in 2 years on the average, each bull is responsible for 108 cows; this is too many; at the most 60 to 70 cows is quite sufficient for one bull. There are 25 villages in this taluk, each possessing over 60 cows and owning altogether 4,213 cows, which possess no breeding bull at all.

List of villages where good cattle are available—Ongole taluk.

Bulls.	Heifers.
Zammalapalem.	Nelatur.
Errejerla.	Gundepalli.
Inamamalluru.	Endluru.
Brahmana Nidamalluru.	Doddavarapadu.
Ravipadu.	Guruvareddipalem.
Prasangulapadu.	Chandrapadu.
Paidipadu.	Nandipadu.
Potavaram.	Munganuru.
Chedlavada.	

In order to further develop and encourage the breeding of good stock, an annual cattle show was established so far back as 1858 and continued until 1871. During these 12 years a total of over Rs. 18,000 was distributed in prizes. The cattle show was resuscitated in 1904 with most successful results and it is doubtful whether such a large collection of bulls and cows of one breed have ever been brought together before in India. The following were exhibited :—

Brahmini bulls	...	...	...	...	...	45
Bulls	...	...	...	...	...	120
Bull calves	...	...	...	...	...	83
Bullocks (single)	...	...	...	...	...	22
Bullocks (pairs)	...	...	...	...	...	31
Cows	...	...	...	...	...	166
Heifers	...	...	...	...	...	132
Buffalo bull	...	...	...	...	...	1
Buffalo bullocks	...	...	...	...	...	9
Buffalo cows	...	...	...	...	...	6
Rams	...	...	...	...	...	38
Ewes	...	...	...	...	...	3
Goats (male)	...	...	...	...	...	11
Goats (female)	...	...	...	...	...	3
Total	...	...	...	...	...	670

The heifers and young bulls were an exceedingly good lot. During 1906, buyers came from Brazil and about 200 young stock were taken away to this distant country where the breed has become very popular. The last Ongole cattle show was held in 1918. For want of funds the show has not been held since.

The characteristics of the Ongole breed are :—

Head.—Should not be too big or heavy; face moderately long; muzzle well developed with fairly wide nostrils, black in colour; forehead broad with well set bright eyes elliptical in shape with dark eye-lashes, a ring of black skin about $\frac{1}{2}$ inch wide round the eyes; the ears moderately long and slightly drooping; horns short and inclined to be stumpy and turning sideways or backwards. In cows the horns are longer and thinner than in bulls and are directed outwards and slightly backwards. The horns should not be split at the base.

Neck.—Short and thick.

Devlap.—Fleshy and hanging in folds, extends to the navel.

Hump.—Well developed and erect; if at all it leans, it should be to the right and not to the left; better if it is filled up on sides and not concave.

Body.—Massive, long and deep, but some are inclined to be flat sided; in fine specimens, the girth behind the hump is about 84 inches and height behind the hump 63 inches.

Chest.—Deep and wide, broad between the forearms.

Barrel.—Long and deep with well arched ribs equal in number on both sides.

Back.—Of moderate length, broad and slightly higher at the croup; the sides from the point of the croup should not be sloping, but fairly level; so also the slope from the line of croup towards the tail should be gentle and not prominent.

Quarters.—Strong, with a gentle droop towards the root of tail; broad loin; rump broad and long.

Sheath.—Pendulous but not too much; well tucked up and thin; black hairs on the tip. Cows have also a fold of skin in the position of the sheath.

Tail.—Thick at the base without coarseness; long and tapering finely to a full switch, which is black. The tip of the tail should reach or just beyond the point of the hock.

Anus.—The hollow under the tail should be wide, well inside the points of buttocks, but the anus should protrude out sufficiently, so that the dung may fall clear from the surface of the body.

Thighs.—Muscular, well developed and deep.

Legs.—Strong and somewhat coarse; not too long, straight with strong shoulders, and set wide apart firmly and squarely under the body; toes pointing straight.

Feet.—Large and somewhat soft looking; the cleft should be closely set in all the four as far as possible.

Height.—Should possess good height, measuring on an average 56 to 62 inches when full grown from ground level to the back behind the hump.

Hair and hide.—Hair fine and smooth, black skin of medium thickness, mellow and loose.

Colour.—White or greyish white with black or dark grey markings on the hump, neck and quarters; black muzzle, black markings on the knees and above the fetlocks on fore and hind legs. Some animals have grey patches or spots showing through their white coats. A few are red and white in colour but are not appreciated as breeding bulls.

Fifteen points in hair marks of Ongoles observed by the breeders in the tract.

Necessary marks—

- (i) One in the line of back towards hump.
- (ii) One in the centre of face.

Good marks—

- (iii) If it is close to hump in the line of back.
- (iv) If there is one below anus where the dung touches the body generally at the time of evacuation.

Undesirable marks—

- (v) If there is one at the left temple or on the left eyebrow.
- (vi) If there is one in the left armpit of the leg.
- (vii) If one exists within 5 inches from the point of croup in the line of back.
- (viii) If instead of one in the centre, two exist on both sides of forehead.
- (ix) If one is present on left side of chest.

Most undesirable marks—

- (x) If one exists by the side of the central line of back on the right or left.
- (xi) If two marks exist one on each side of the central line of back.

- (xii) If two marks exist on the face one above the other.
- (xiii) If there is one round about the knee joints in one or both the legs.
- (xiv) If one exists on one or either side of the tail at the root.
- (xv) If there is one in the pit between tail and anus.

Note.—It is possible that opinions differ with regard to hair marks according to the locality. In the case of conformations opinions differ in two points, for instance, some prefer short barrel and tip of tail not extending beyond the point of hock and some like long barrel and long tail in consequence.

In 1918, the Madras Government opened the Ongole Cattle Farm at Chintaladevi in the Kavali taluk of the Nellore district, the object being to produce a number of good bulls annually for distribution in the breeding areas, the improvement of the milk yield and early maturity in heifers. The farm was in an out of the way place and 36 miles by road from Kavali railway station; the district is favoured by both the monsoons but no reliance can be placed on the rainfall. Some years it fails and in others it is a deluge which damages the crops and washes out the seed. Cattle thrive well on this farm.

Forty-six cows and five bulls were purchased in the tract as foundation stock. Breeding was carried on by selection; irregular breeders, etc., were weeded out annually, about 25 of the foundation cows were retained. The heifers born to these cows have been carefully reared, the best animals were retained for the farm and mated to good bulls, the others were sold away.

In 1931 particulars of the various classes were worked out as follows:—

(1) The average milk yield for—

(a) Foundation stock 2,674 lb. with a daily average of 9.8 lb.

(b) Farmbred cows with over 2 lactations, 3,526 lb. with a daily average of 11.5 lb.

Farmbred cows show an increase of 852 lb. milk in a lactation with a daily average increase of 1.7 lb. per cow. The average yield of farmbred stock even including cows with one or two lactations is 3,251 lb. with a daily average of 10.5 lb.

(2) The average maximum yield for—

(a) Foundation stock, 3,714 lb. with a daily average of 11.6 lb.

(b) Farmbred cows (over 2 lactations), 4,047 lb. with a daily average of 12.6 lb.

Farmbred show an increase of 333 lb. milk with a daily average increase of 1 lb. per cow. Generally it is accepted that the third or fourth lactation will be the best, but in the case of these cows, cows aged 12 to 14 years have sometimes yielded their maximum yield in later lactations.

(3) The highest individual yield in a lactation is—

(a) Foundation stock : 5,422 lb. ; daily average 14.1 lb.

(b) Farmbred cows : 7,190 lb. ; daily average 21.5 lb.

On this station 10 cows have yielded over 5,000 lb. milk and 12 cows between 4,000 and 5,000 lb. milk in a single lactation.

(4) The best individual average milk yield in each class is—

(a) Foundation stock : 3,761 lb. ; daily average 11.5 lb.

(b) Farmbred cows (4 in number)—

5,682 lb. ; daily average 17.1 lb.

5,714 lb. do. 16.1 lb.

5,258 lb. do. 14.0 lb.

5,361 lb. do. 13.7 lb.

(5) The average dry period omitting abnormal cases is—

Foundation cows 177 days.

Farmbred cows 147 ..

The average milk yield of the breed is estimated at 2,500 lb. with a daily average of 9 lb. per day.

Heifers calve at the age of 3 years 1 month on the average whereas in the district they calve down at the age of 4 to $4\frac{1}{2}$ years.

The average weights of the calves at birth are—

Bull calf 65½ lb.

Heifer calf 60 lb.

The heaviest weights being for a

Bull calf 79 lb.

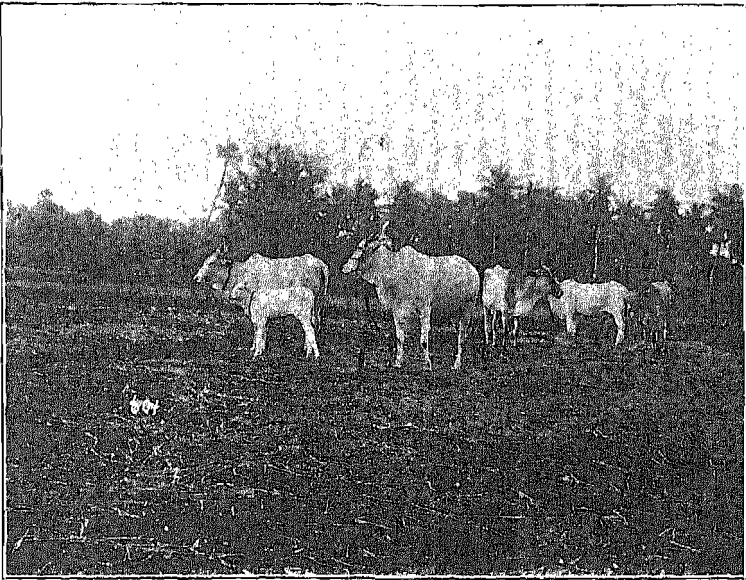
Heifer calf 84 lb.

Calves are either white, white with reddish brown patches or reddish brown in colour and they generally change to pure white at the age of six months or so.

The average weight of a cow is about 900 lb. to 1,000 lb. and a bull from 1,200 to 1,350 lb. A fully grown bull of good size will weigh about 1,500 lb.



ONGOLE WORK BULLOCKS.



ONGOLE RYOT'S COWS.

The following table gives the yields of some of the best cows :—

Cow num- ber.	Age.	Number of calvings.	Average milk yield.	Average daily average.	Maximum milk yield.	Average number of days dry.
	YRS.		LB.	LB.	LB.	
2	14	9	3,226.4	11.1	5,422	213
25	15	8	3,761.9	11.5	5,351	216
33	15	9	3,384.9	10.6	4,358	129
13	11	7	2,934.7	11.9	4,723	118
57	12	5	3,238.4	10.0	4,504	172
71	11	5	4,070.2	12.9	4,779	137
78	10	5	3,326.6	9.9	4,142	213
79	10	4	3,717.2	11.2	4,156	335
87	9	5	3,746.8	10.8	4,008	116
95	6	3	5,682.0	17.1	7,190	140
100	8½	4	4,340.0	14.5	5,421	261
101	8½	4	4,660.1	14.1	5,355	133
107	6	3	5,714.0	16.1	6,687	149
109	8	3	4,485.5	13.5	5,295	195
111	8	4	4,838.3	16.3	5,205	161
116	7	3	3,489.0	12.9	4,251	143
133	6	2	4,408.6	13.1	4,873	208
93	7	3	3,935.0	12.1	4,877	156
119	5½	1	4,330.0	11.2	4,330	..
120	5½	2	5,236.0	12.9	5,236	167
148	5½	2	4,890.0	20.6	4,890	..
191	5½	2	5,361.0	13.7	5,361	66

The percentage of fat in Ongole is between 4.5 and 5.8.

Twenty-five Ongole cows were purchased in 1925 for the Hosur Cattle Farm which is 3,000 feet above sea level. The farm is chiefly grassland, the soil is laterite and contains very little, if any, lime. This breed has not done well, the milk yields are poor, the calves are lighter in weight at birth and the bulls do not grow into such big animals.

Growth of Ongole calves.

Number.	Born.	Sex.	Date of weighment, etc.	at		Girth.	Length.	Neck.	Weight.	Increase.
				Height hump.	Height croup.					
				INCH.	INCH.	INCH.	INCH.	INCH.	LB.	LB.
53	25th March 1922.	Bull.	1st April 1922.	30	31	28	29	7½	66	182
			2nd October 1922.	45	44	44	45	12	248	
54	2nd April 1923.	Bull.	8th April 1922.	31	32	27	32	8	70	190
			2nd October 1922.	43	44	44½	45	12	200	
63	5th June 1922.	Bull.	8th July 1922.	31½	33	28½	30½	8½	74	185
			8th January 1923.	43½	45	44	46	13	250	
62	31st May 1922.	Bull.	8th July 1922.	31	33	28	29	8	72	178
			8th January 1923.	42	43½	43	44	12	250	
60	23rd May 1922.	Heifer.	8th July 1922.	31	32½	28	28	8	64	180
			8th January 1923.	42	43½	43	44	12	244	
88	16th January 1923.	Bull.	26th February 1923.	33	35	30	36	10	100	254
			13th November 1923.	47½	49	47	53	18½	354	
69	20th October 1922.	Heifer.	5th March 1923.	40	42	37	40	11	185	208
			21st November 1923.	47½	50	49½	54	19	393	
61	27th May 1922.	Heifer.	27th May 1922.	30	32	26	26	7	60	236
			20th January 1923.	45	47½	46	48	13	296	

On the average the calves have gained 1 lb. in weight per day for six months. Regarding growth it is seen that in six months, the height of the calf behind the hump and croup has increased nearly 35 per cent and the measurement of the girth, neck and length by about 50 per cent.

The Ongole breed, being of the heavy type with large loose frame, large dewlap and pendulous sheath, such as the Sanewal or Montgomery, Hariana, Kistna valley cattle, etc., is susceptible to have loose horns. The horns do not swing when the animal moves, but when they are taken hold of and shaken by the hand, it is found that in some instances both horns are slightly loose, in others, one is loose and the other is tight. It is due to the horn core not growing well. It is not a defect. This question has been studied but no reasons have been discovered so far. With bulls, the horns grow very slowly, they are large and stumpy at first and in some cases, they split. It was found that some had loose horns at 2½ years old but these became tight after another year.

There is really no distinctive type of horn in the Ongole breed; it is very rare indeed to see a pair of work cattle with the same shape and length of horn.

Superstitions regarding Ongole cattle.—Like all agricultural classes, the ryots of the East Coast are very superstitious. They are usually very unwilling to exhibit a favorite cow owing to the influence of the evil eye (Dhrishti). A bullock whose tail has the

root of the tuft of hair situated above the hock is said to have "Eru-Val" and to bring ill-luck. This is not objectionable in the cow. A bullock having white eyelashes, flesh coloured muzzle, light coloured horns and hoofs is considered of weak constitution and should not be purchased. A black bullock is generally considered to be a rogue; if not a rogue, he is considered to be of great value. The saying is:

"a black bull is but the fourth of a bull; but if he is guileless he is a bullock and a quarter."

A bullock with numerous small spots over the body "like a deer" is considered very lucky.

The form of the horns is supposed to indicate many things and received as many names: for instance "Madakombu" means horns bent backwards and is considered an excellent sign in a cow. There is an old saying "let any man who does not know how to select a cow purchase one with horns bent backwards." Straight horns are liked. Horns pointed forwards "Kopadi" indicate spirit. Irregular twisted horns "churuttai" are not objected to. Those which appear hollow and have light coloured patches "Kolli-kombu" are considered to be very disastrous. Horns with white top "Punkombu" are also bad. If a cow at the time of purchase voids urine, it is considered very good omen, but if she passes dung it is a very bad sign. The reverse is the case with a bullock.

A bullock which fails to cut the fourth pair of corner incisors is called "Arukattai-Madu" and is considered lucky. The saying is:

"he who purchases a bullock with only six permanent teeth (incisors) will become rich enough to purchase an elephant."

A bullock which cuts only seven permanent front teeth is unlucky to its owner, and is responsible for the saying that—"he who purchases such a bullock should have the preparations for his funeral made ready."

Certain observances are most scrupulously carried out by both purchaser and seller at cattle sales and in fact, have become unwritten law resting for authority on long consent. Disregard of these details in the procedure is seriously believed to imperil the prosperity of the owner, the seller, and the innocent animal: the following are the principal ones:—

- (1) After the price has been fixed, the buyer hands the seller a silver coin, either a two-anna bit or a rupee as earnest money.
- (2) The balance of the money may be paid at once or at any stated time afterwards.

- (3) The seller has to pay the purchaser a four-anna or an eight-anna bit for what is called "Maralu labham" of Pathi Vithamulu (cotton seed). It is intended that this money should be used by the buyer to purchase fodder for the animal for that day. The purchaser is always careful to go with four-anna pieces in the event of the seller not having change for rupee.
- (4) The buyer must never tie up the animal with his own rope, and therefore a purchaser never carries one.
- (5) The seller must always supply the purchaser with a new rope, and if it is not available, he gives the purchaser raw material which must be braided or twisted into a rope. The seller must never give the rope already used by the animal.
- (6) The seller in company with the purchaser should for a short distance lead the animal himself with the fresh rope and then transfer the rope to the hands of the purchaser who then takes the animal home. This settles the sale contract and is never disputed.

The conditions of the sale are never reduced to writing.

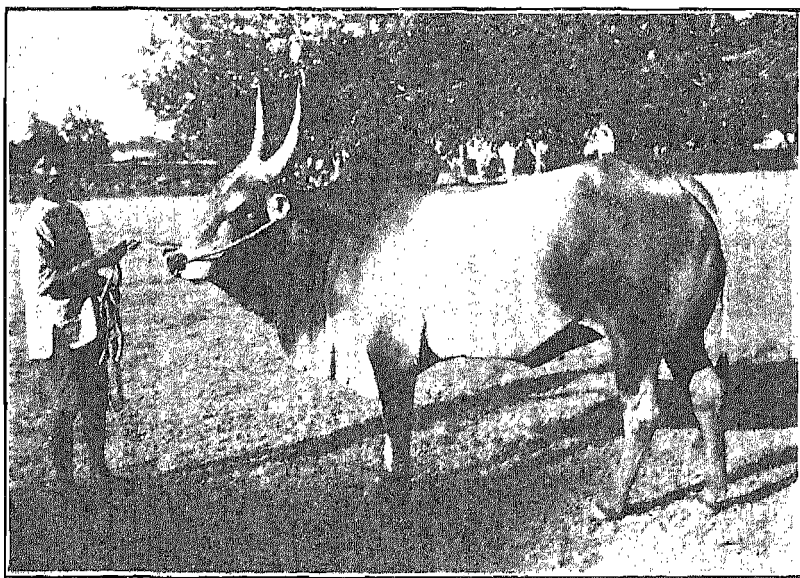
KANGAYAM BREED.

This breed is also known by the names of Kanganad, Kongu, and Kangayam and derives its name from the taluk of Kangayam.

These cattle are bred in the southern and south-eastern taluks of Coimbatore. There are said to be two varieties, a large and a small. The smaller are found to be more numerous in the Kangayam, Dharapuram, Udamalpet, Pollachi, Palladam and Erode taluks, while the larger variety are more prevalent in Karur, Aravakurichi and Dindigul taluks. It is understood that the celebrated Kangayam breed are not the common cattle of Kangayam, but are the property and produce of larger breeders such as the Pattagar of Palayakottai and his family, the Kadiyar Munsif Monigar, etc., who maintain herds of from 500 to 1,000 head, and keep large numbers of cows and bulls for breeding only. Many ryots however own from 10 to 20 head of cattle which are reared for sale. These cattle are sold, not at ordinary markets but to dealers, who come to the district for the purpose, or at large cattle fairs such as Avannashi, Tiruppur, Kannapuram and Madura.

The breed in its purest form may be seen in the herds of the Pattagar of Palayakottai who has been an extensive breeder for many years and also at the Hosur Livestock Research Station.

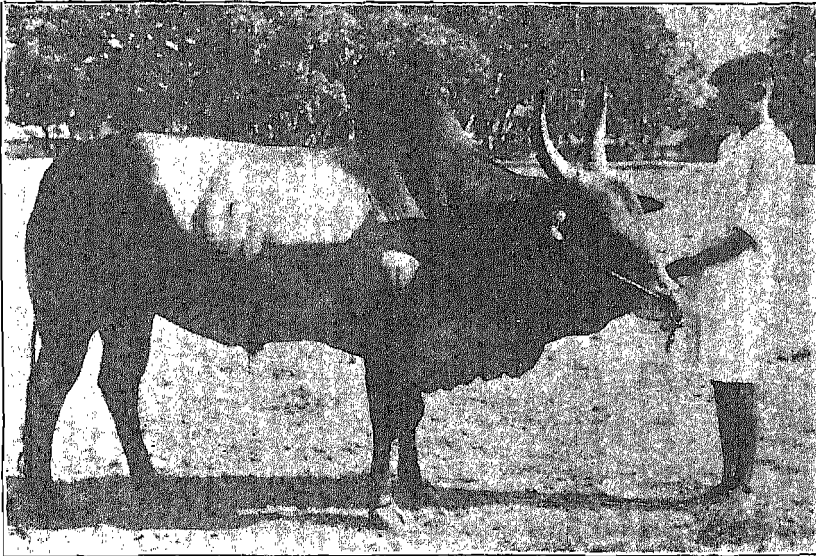
It is curious to note that the animals seen at the several cattle fairs held in what is practically the home of this breed, are not nearly so good as animals of the same breed which are sold at fairs in the southern districts. There are probably two explanations for this, firstly, that it is not profitable to export any but the best selected animals, and secondly, purchasers select the very young male stock, and these are taken away to good grazing grounds where they are specially fed up, but the fact remains that better pairs of bullocks of this breed are to be met with in the Madura and Tinnevely districts, than in the neighbourhood of Kangayam. Another reason is that the ryot of these parts can purchase bullocks of the Mysore breed and Alambadi breed at cheap rates, sells his Kangayam bullocks to ryots of other parts at a higher rate.



KANGAYAM BULL NO. 90.

In the breeding of ordinary cattle of the district there does not appear to be much, if any, care taken in setting apart bulls. Every ryot keeps his cows and other cattle in his own fields which are all fenced, a practice which scarcely is to be seen beyond the limits of Coimbatore. As the young stock are often parted with at a very early age, and there is an exchange from hand to hand always going on, it is impossible to trace out the origin of the majority of the stock.

Kangayam breeding tract.—This cattle breeding area consists of the whole of the Dharapuram taluk, and with it may be included the adjacent parts of Palladam, Erode, Karur, Palni and Dindigul taluks. Breeding however centres round the Kangayam division of the Dharapuram taluk. Here it is that real breeding is carried on, but there seems to be no reason why, if encouraged, systematic breeding should not extend to the taluks above mentioned. Of course, there are black soil tracts in many of these taluks, where cultivation is much more profitable than cattle breeding but it is the lighter soils of these districts which are most suitable. These are usually shallow soils, which the uncertain rainfall of this tract renders uncertain when under crop, but they are sufficiently loamy in character to retain enough moisture for pasture for a considerable time. The best land for cattle rearing is probably what is



KANGAYAM BULL NO. 35.

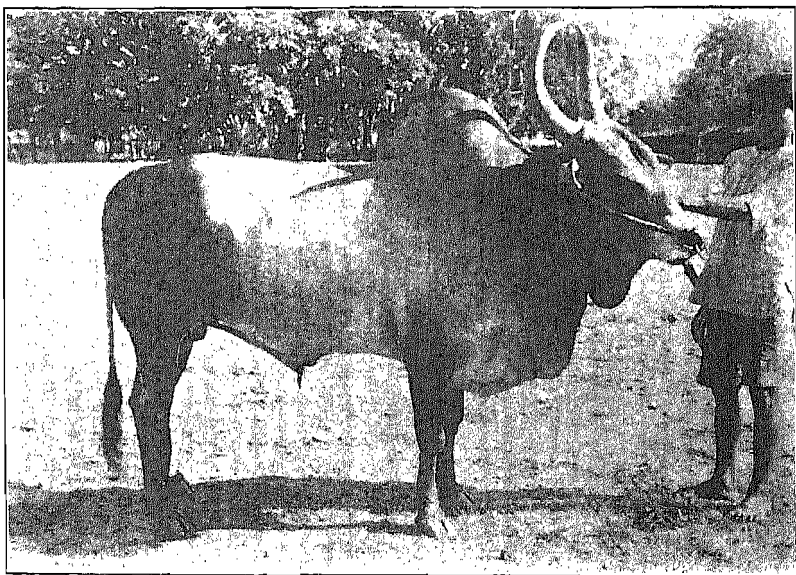
known as "Odai Jelly," a red loam full of canker gravel. Such soils are known to be cool, and even though shallow, are retentive of moisture, while the calcareous substratum is excellent for the formation of bone and sweetness of pasture.

The rainfall is also an important consideration. In all the taluks mentioned it is distributed throughout the year and is always precarious. Thus all dry crops may or may not fail. There is always an uncertainty about them, while cattle are a much more certain source of income from the land. Therefore the ryot has learnt to a great extent, to depend on his wells for his cereal grain crop, and

if necessary also for his straw. The rainy seasons are three in number—

- (1) The hot weather rains.
- (2) the south-west monsoon.
- (3) the north-east monsoon.

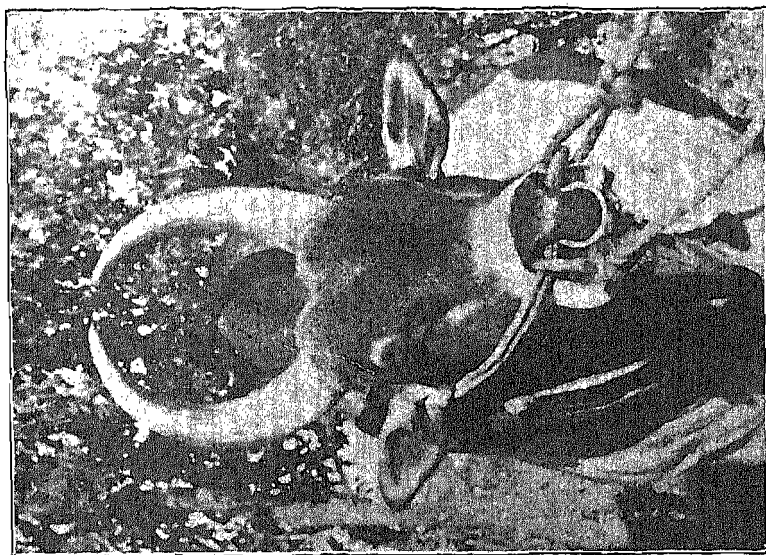
and though the rainfall may not be sufficient to raise a cereal crop, it is practically always sufficient to raise a crop of grass and usually two or three flushes of pasture.



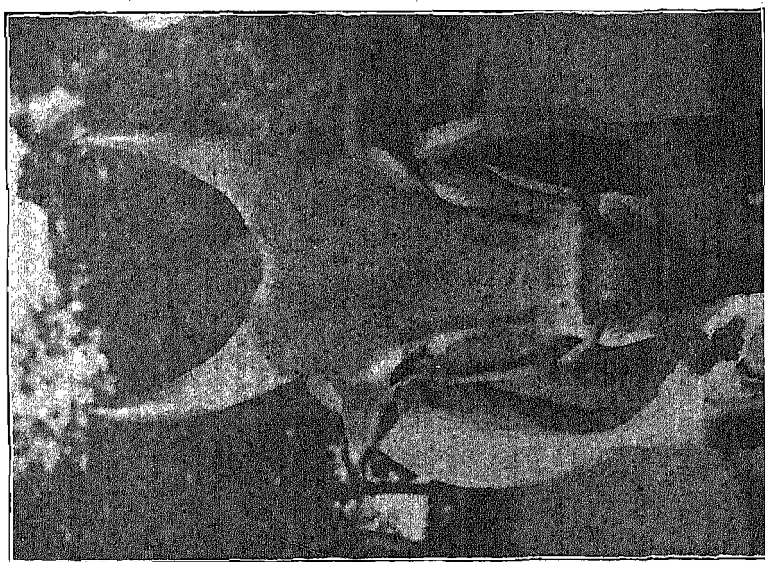
KANGAYAM BULL NO. 33.

In the Dharapuram taluk, grazing grounds are conspicuous by their absence and this fact, combined with the universal system of fencing, has undoubtedly been one of the main causes for the development of cattle breeding. Cultivators have early learnt to depend on their own lands (encouraged no doubt by the former "Pillu-patta") for their grazing. Yet, this grass or "Pillu-patta" has been abolished and grazing lands pay the same assessment, whether under crop or pasture, there still remain large areas of pasture lands. These private pastures are common throughout Dharapuram and extend also into Palladam, Palni, Karur and Erode taluks. Fencing is an essential for these grazing grounds, and without it, they would be of little use. With fencing the ryot has absolute control over his grazing and can limit the number of stock, which he maintains but in spite of which the general aspect of the

country shows, a far larger number of breeding stock than are usually to be seen. The tract is also fortunate in having such an excellent grass as Kolukkattai pillu (*Pennisetum cenchroides*), which is the mainstay of the temporary pastures, as well as many of



ADULT BULL, HORNS CURLING BACKWARDS, FORWARDS AND INWARDS, TIPS ALMOST TOUCHING.



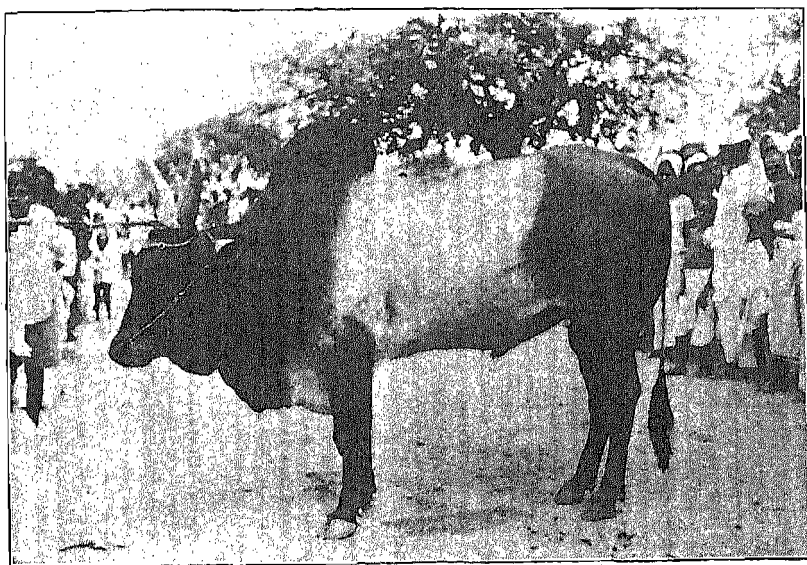
YOUNG BULL—2½ YEARS—HORNS FAIRLY LONG, GROWING BACKWARDS AND OUTWARDS.

the more permanent pastures. Fencing also allows of a rotation in pasturage which is an excellent thing. In many pastures, manure is not collected and in consequence, the crops, following the ploughing up of pastures, yield much more heavily than they would otherwise do. Thus, though pasture, may limit the area which remains for the cultivation of cereals, it increases the acreage yield. "Kolukkattai" pastures are found throughout the tract and trials with this in Tinnevely on the light red soils of that district show that its cultivation might be much further extended, if necessary, and its introduction, if grazing was regulated, would be of immense value. It is a grass with bulbous root stock, which can maintain its vitality through the severest drought; it seeds freely and its seeds are easily shed. Thus a heavy rain at any season causes a rapid rush of pasture, which in a few weeks grow to a foot or more in height. Even when pastures are ploughed up the grass is not killed. In fact it is a practice to plough through Kolukkattai pasture every third year to quicken the grass. Thus, even freshly broken up lands continue to supply pasture when the crop harvest is over. In the Dharapuram taluk, it was stated that, even lands, commanded by wells, are sometimes laid down to pasture; many lands are actually sown with Kolukkattai grass seed when laid down.

The main unirrigated cereal crop in the Dharapuram taluk is cumbu and the straw of this, unlike that of other districts, forms the main fodder supply. It is a four months variety with a branching habit known as "nadam" cumbu and is sown usually in July-August. This habit gives a fine straw and plenty of leaf and the straw is harvested when the dew is on for two reasons; (1) the leaf is not brittle and does not break off, and (2) the moisture supplied by the dew makes the fodder more succulent when it is stacked. With this cumbu straw there is always a proportion of pulse straw, since these latter crops are always sown as a mixture with a dry land cumbu. The cumbu straw is, of course, supplemented by the straw of cholam crops grown under wells, and also fodder cholam is sown thickly as an irrigated crop under wells in years of serious shortage.

Lately in-breeding appears to have become less common and breeders often buy their breeding bulls from outside their own herd, usually from the Pattagar of Palayakottai, who is the biggest and most advanced breeder in the tract, or the Hosur Livestock Research Station, thus showing that there is a strong tendency among breeders to meet the supply for good animals. The big breeder has also the advantage of selection which he uses to some extent, especially, in weeding out cows which do not breed regularly. Big breeders when questioned, all stated that their cows bred once a year or thereabouts and that if a cow did not breed

regularly, there was no profit in it and the animal was sold. Small breeders stated that many cows only breed every two and sometimes three years; that they broke them into the yoke and used them for agricultural work, which often made them breed, but, if that failed, they sold them to petty ryots who use them as working cattle, either in the mhoite or for agricultural work—in fact for any work except carting. Thus it can be seen that the petty ryot is saddled with the worst of the female stock, that for the service of this cow he has, either to have them covered by a young bull, usually of his own breeding, or else have them covered by the bull of a big breeder to whom he has to sell the resultant offspring. There are at present about forty premium bulls in this tract and the small ryot has access to these, this number will increase yearly with the aid of the district boards, who are anxious to improve the cattle in their districts.



KANGAYAM BULL, FIRST PRIZE, TIRUPPUR CATTLE SHOW.

Rearing and feeding.—The practice among big and small breeders is very much the same, though, as a rule, the small man takes more care of his young stock especially of promising young animals. For the first six weeks the calf is allowed as much milk as it requires and is kept tied up during that period, after that, green grass is put before it daily until it has learnt to eat, when it is turned out to the pasture, and the amount of milk allowed is gradually reduced until the animal is weaned. Small breeders however, in the case of promising calves, allow them all the milk and in

some cases, when the cow does not give sufficient, they draw milk from other cows and feed the calf by hand. Cows, whether in calf or in milk, weaned and growing young stock are given pasture when this is available. When not available, they are given fodder supplemented by a thin gruel made of pulse husks, bran of cereals, rice water and the ground up pods of Vel-vagai (the white babool). Ground cotton seed is also added if necessary. As a rule, young bulls are muled when they get their second pair of teeth and are broken to the yoke before being sold. They are not trained for mhothe work until they have cut their third pair of teeth. Mulling is almost universal in India the process being to crush the testes between two stones. It is a very painful and cruel method, the Veterinary Department are now persuading the ryots to have their young bulls emasculated by the Burdizzo method which is practically painless, bloodless and quick. Young unbroken animals are never sold by big breeders. These are only sold by petty ryots, who are pressed for money.



KANGAYAM BULLOCKS, TIRUPPUR SHOW.

Regarding the Pattagar's cattle, however, this is different. His herds show a very different system of management, there is a careful selection of sires and dams, the young stock are properly reared and consequently attain a development rarely seen among cattle of the same breed met with in other parts of the district. In the

first place he provides a considerable area of permanent pasture land. His land being fenced, it is easy to separate the herds of different ages and sexes, the heifers run in one herd and the young bulls in another, the cows in a third and so on. He states that he keeps the herd pure by using sires only from his own herd, though the appearance of some of the cows and heifers was such as to give the impression that they had a strain of the Ongole and Mysore blood in them, and as a matter of fact he possessed several pure bred Ongole cows at one time. One herd belonging to the Pattagar consisted of about thirty-five young heifers about three years old with a bull running with them. This herd was a remarkably fine one, the heifers being in fine condition, and were a very level lot, showing great quality. The prevailing colour was white with grey markings about the hump and quarters, though there were many fawn, fawn white and even light reds. The latter are not thought so highly of as the whites or greys, although they are just as well made. The bull was a dark grey verging to black on head, hump and quarters with the characteristic broad face, short, thick, but pointed horns of the breed. The pasture on which the herd was grazing, although rather bare owing to the absence of rain, showed a strong sward, and was evidently well able to carry the stock on it, and which received no additional food.

Another herd consisted entirely of young bulls, all of them between one and two years old. These were a very even lot, showing however a considerable variation in colour. Another herd consisted of young bullocks which had been castrated at three years old, and were chiefly intended for sale. The Pattagar castrates his bulls at three years old, and formerly sold nothing but bullocks. This was in 1909, but at the present time (1931), the Pattagar sells bulls and cows for breeding purposes; he has supplied the Madras Government with a nucleus herd of Kangayam cattle, also the Ceylon Government and breeding bulls to the Coimbatore District Board for breeding purposes.

It is doubtful whether there is another landowner in India who pays so much attention, or carries out the systematic cattle breeding on such good lines as the Pattagar, and this only shows what can be done if due attention is paid to the essential requirements. He owns a big estate of about 14,000 acres, he leases some of this to the families of his workmen working under him at a low rent, on condition that a member of the family works on his farm and at the same time the man is fed in the middle of the day by the Pattagar. Added to this, the Pattagar is liberal and sympathetic in times of need to his workmen and this adds in the smooth and successful running of his farm and cattle breeding. He provides bulls for his tenants on condition that he has the first choice of all the bull calves born to these bulls at a price arranged.

During the last seven or eight years this tract has suffered for want of good rains and this has had an effect on the cattle in the district excepting the Pattagar's cattle, as he purchased fodder for his cattle from districts such as Tanjore and Trichinopoly during seasons of poor rainfall and he also sent some of his cattle to good grazing districts.

The Pattagar maintains a herd of about 2,000 head of stock and he sells annually about 300 breeding bulls and bullocks to ryots in Coimbatore and the southern districts as far as Tinnevely.



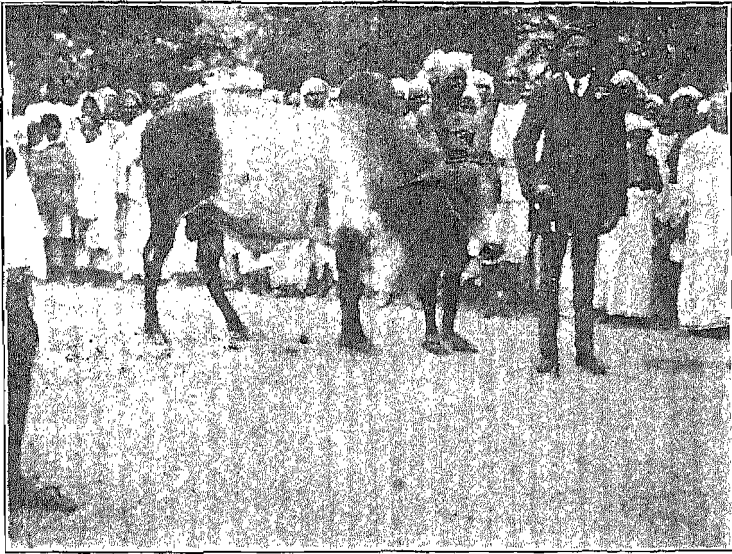
YOUNG KANGAYAM BULLS AT HOSUR.

Col. Gunn states in his book "Cattle of Southern India" that the cows of this breed are said to be fairly good milkers and are preferred by some people on account of their small well set frame. The price of small bullocks varied from Rs. 40 to Rs. 70 per pair, but the larger varieties command much higher prices. Cows, when in full milk, may be obtained for about Rs. 40.

The breed must have undergone some changes in the last twenty years as the cows of this breed are very poor milkers on the whole, the average milk yield for a lactation is somewhere about 1,500 lb. with a daily average of 5 lb. per cow. The Kangayam cow of to-day is a medium sized one and very compact. A pair of average bullocks of this breed will cost about Rs. 300 to Rs. 400 and if you wish to purchase a good pair from a breeder like the Pattagar, the cost will be anything from Rs. 400 to Rs. 600 the pair. A good Kangayam cow will cost at the present time in the district about Rs. 100

and a well bred one from the Pattagar about Rs. 150 to Rs. 250. Cows are generally valued in these parts according to the number of good bull calves they are likely to yield, a cow which has produced two bull calves previously will fetch a much higher price than a cow which has produced two heifer calves. Ryots are not keen to sell cows which throw a good number of bull calves.

The custom in South Coimbatore is that if the ryot possesses only a garden, he keeps his cattle within his garden with the exception of the cows which are kept at home. If the cultivator possesses dry lands he grazes his cattle during the day, and keeps them in the house compound during the night. Some keep their cattle night and day on these dry lands.

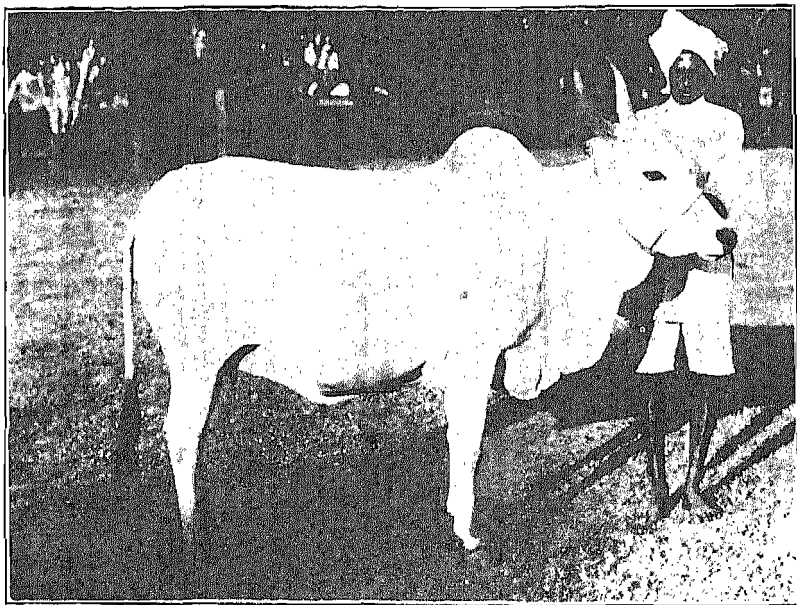


THE PATTAGAR OF PALAYAKOTTAI WITH HIS FIRST PRIZE KANGAYAM BULL
AT TIRUPPUR SHOW.

It is not customary to afford shelter against the sun and rain, but the cattle are protected against the furious winds which prevail in Southern Coimbatore by screens of bamboo mats and branches which are formed into a pen. These pens are moved at intervals of one or two days, and in this way the whole field becomes manured. In this way also ticks, which are a great pest to cattle and increase where cattle are confined, are prevented from fixing on them.

The following is the daily routine of cattle worked in gardens. At 6 a.m. the ryot gives his cattle water either with or without bran, after which, they work at the plough or wells till 11 a.m.

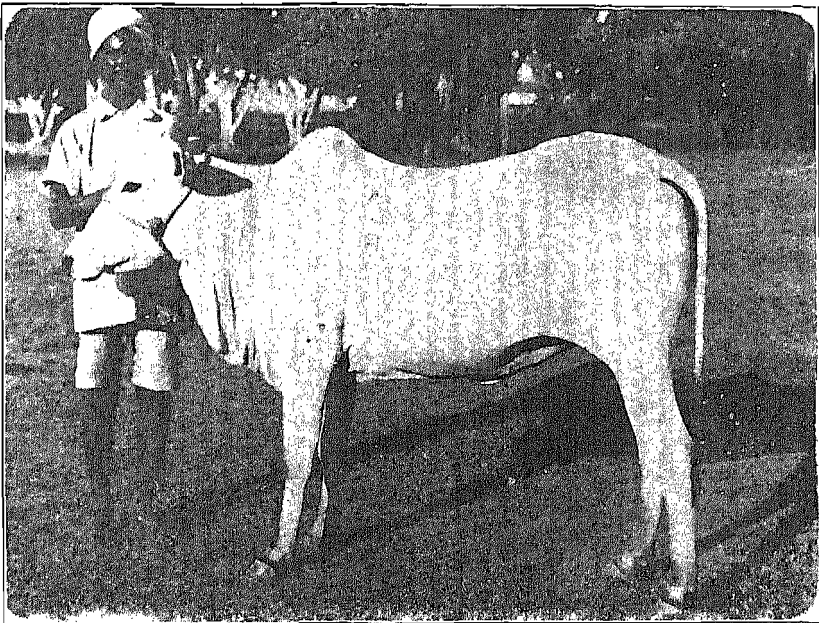
they are then tied up under the shade of a tree, watered and fed. Special food consisting of bran, cotton seed, cake, and gram soaked and ground, is given in addition to a full ration of straw or as much as it can eat. At 2 p.m. work is resumed and continued until 6 p.m. The animals are then tied to pegs in the garden or taken to the house, and straw is given in small quantities at intervals during the night. The straw ration consists of cholam, ragi, tenai, samai, varagu, paddy, chola-chukkai (top of cholam containing ears after the removal of the grain), horsegram stalks and empty pods. As a rule no special feeding is given to cows or bullocks not in work. The cattle graze on the harvested fields, and the few fields which lie fallow or any wasteland. A few ryots in Kangayam, reserve some lands for grazing on which Kolukkattai grass is grown.



KANGAYAM COW.

Fodder crops, grown as such are rare, but the practice is known throughout the district and is occasionally followed. In the Kangayam division of Dharapuram where the best cattle are still reared, there is a regular practice in February and March of growing either cholam or cumbu, chiefly the former under well irrigation, this is called "adar-cholam" (meaning close or crowded) from its being sown closely, so as to yield heavily and of thinner stalk, and is grown at such time that fodder may be most needed. It is cut down before earing, and affords considerable provision during the

hot weather. Fodder crops are not grown on dry lands, there is sufficiency of pasture except in the hot weather, and as it is unusual to get sufficient rains even for ploughing during the period reckoning from December to the 15th April, no such crops are possible except on garden lands. Cholan straw is a favourite fodder, and is carefully stacked for further use; the numerous stacks that dot the black cotton soil of Udumalpet and all gardens, are an agreeable feature in the landscape. Paddy (*Oriza Sativa*), Samai (*Panicum miliare*) and Ragi (*Eleusine coracana*) straw are equally approved of, cumbu not so much. The ryot excuses himself from growing fodder by alleging, and with some reason, that as his cholan fodder is little injured by growing to maturity, he grows cholan



KANGAYAM COW.

as a grain crop rather than as a fodder crop for the double yield. The expenses of well irrigation in the hot weather are considerable, and few can afford to lose the grain of the crop.

The main market is in the south where bullocks of this breed are much sought after, both for black cotton soil cultivation and for mhote and road work. Higher prices are paid for bullocks of this breed than any other. Rs. 300 to Rs. 500 is no uncommon price for a pair of good young bullocks, whilst cases are known where Rs. 700 has been demanded and given for specially good pairs. The Kangayam is an excellent doer and thrives on much poorer fodder

than other breeds. It has an excellent constitution, is very hardy, and will often last for ten or twelve years at mhoté work, while the Alambody (the other big breed of the south) will not, it is stated, last for more than six or seven years at the mhoté, and often not even that. Rise in the prices of Kangayams has been much more rapid than that of other breeds, which shows its popularity on the market. This rise is probably due to some extent, to the rapid increase in well irrigation in the south. The number of carts has also risen within the last twenty years. Besides this outside demand, the large breeders themselves take their animals for sale to the cattle fairs held during the car festival at Avanashi and Tiruppur.

From the above description of the Kangayam tract it will be seen that, even there, there is considerable scope for improvement, especially among small and petty breeders and it is gratifying to note that the District Boards of Coimbatore and Salem, together with co-operative societies are doing their best to improve the cattle of this tract. There is evidence also that in time, if more assistance is rendered, the art of cattle breeding may be spread to neighbouring taluks or even further afield. The improvement in the present breeding area and the expansion of the breeding area, both seem essential for the ultimate good of the country. Kangayam furnishes the best example in this Presidency of mixed farming, and mixed farming is bound to develop in dry taluks as the remaining available lands are taken up for cultivation. A well and garden lands supplemented by dry cultivation and grazing lands are the ideal conditions for mixed farming. The garden lands require heavy manuring and for this reason the ryot has to keep more cattle and livestock than he actually requires for working the mhoté, carting silt and produce and cultivating the land. The garden lands are, in years of scarcity, his mainstay both for himself and for his livestock. Thus there is no reason why if encouraged he should not keep good breeding stock. To keep these in condition he must have ample grazing, which he should be able to procure on his own dry patta lands, reserved for this purpose, provided his fields are fenced. These would only be temporary pastures, and would manure themselves, and if worked in rotation with other dry arable land, would not only maintain but would improve their fertility. This seems the ideal to aim at, especially in tracts of scanty rainfall and shallow soils. A start should therefore be made in the centre of the breeding tract to encourage the breeding of better stock, especially by the small and petty farmer. These people being brought up in a breeding tract, understand the breeding and rearing of livestock and already appreciate the profit to be derived therefrom. Thus the provision of sufficient breeding bulls seems all that is required here. These, however, would have to be provided in large numbers. An

average bull will not be able to cover more than 80 cows in a year, and even then would require careful feeding and exercise to maintain him in condition. When the success of this course was proved, then would be the time to supply bulls to the adjoining tracts in the same way, and thus gradually extend the breeding area. It appears useless providing bulls in places where the people have no knowledge of cattle breeding and rearing, and consequently, no idea of the profits to be derived from this branch of agriculture. When they have learnt this, then is the time to try and effect some improvement. There are four essentials in placing bulls :—

- (1) The animal must be of a type acceptable to the people.
- (2) It must be a sure stock-getter.
- (3) It must be in charge of some one who has the goodwill of all the classes of the community and understands the management of such animals.
- (4) It must be placed in a suitable village where its presence will be appreciated.

Both varieties of this breed are strong, active animals with compact bodies, and short stout legs. In the larger variety the horns are much longer, and of different shape to those of the small. They curve outwards and almost complete a circle at the point where they approach the tips, and for a distance of three or four inches have a sharp backward curve. The prevailing colour is pure white.

A description of the breed is as follows :—

Head.—Short with broad level forehead, eyes dark and prominent, ears short and erect. Horns in the smaller variety are spreading apart, straight with a slight curve backwards short and thick with sharp points. In the larger variety the horns are much longer, curve outwards and backwards and almost complete a circle at the point where they approach the tips.

Neck.—Short and thick.

Hump.—Fairly well developed.

Dewlap.—Thin and extending to the sternum only.

Body.—Compact and well ribbed up.

Back.—Short, broad and level.

Quarters.—Strong and slightly drooping.

Sheath.—Not pendulous, well tucked up to the body.

Tail.—Moderately long and thin and tapering with a good switch of hair.

Legs.—Short and of good bone.

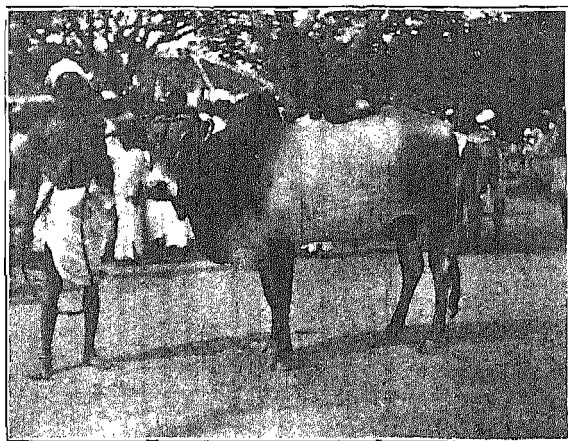
Feet.—Small and hard.

Colour.—Bulls are gery in colour with black or very dark grey colouring on the head, neck, hump and quarters.

In the cows the prevailing colour is white and grey with black markings on the knees and just above the fetlocks on all four legs. They have a black ring around the eyes. The teats are flesh coloured or mottled. Some cows are found which are fawn, red, black and broken colours, but these are not desirable.

Hair and hide.—The hair is fine and short and the skin is black.

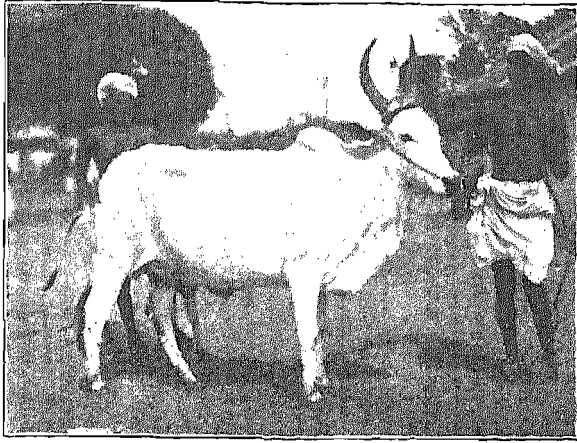
This breed is very hardy and thrives well on scanty rations when compared with the Ongoles and Scindes. At Hosur the herd maintains very good condition on grazing plus hay. Cows with calf at foot are given a little concentrated food. They are the most economical cattle to keep.



BEST KANGAYAM BULL.
Gold medal, Tiruppur, 1927.

At the Hosur Livestock Research Station a herd of 170 cows is maintained. The aim is to build up a herd of pure Kangayam which will breed true to type and to distribute breeding bulls and cows to the ryots.

The Kangayam breed is not a milch breed but cows are milked out one day each week to ascertain their yields. It is hoped to increase the milk yield of this breed without impairing the draught qualities.

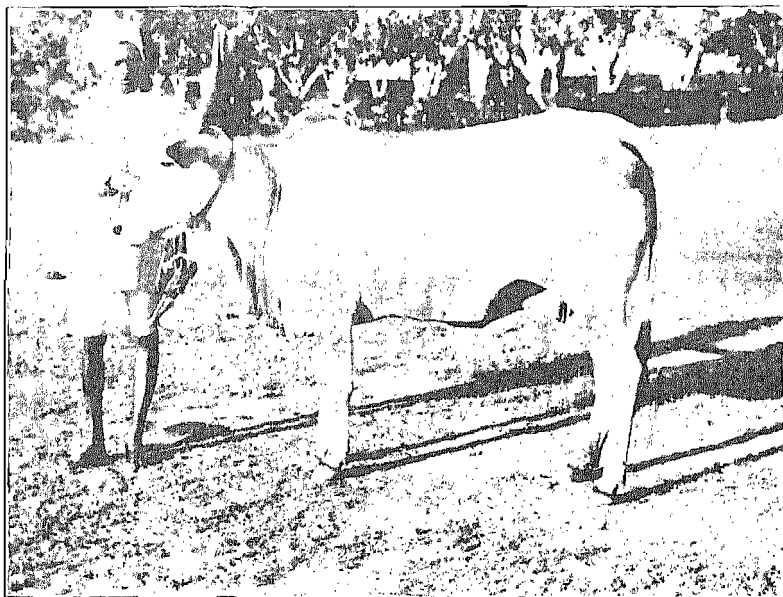


BEST KANGAYAM COW.
Gold medal, Tiruppur, 1927.



BEST KANGAYAM BULL.
Gold medal, Tiruppur, 1927.

In the foundation stock which was purchased in 1925 and 1928 it is seen that a Kangayam cow calves on the average once in 15 months, that is, if she is well maintained, so far it is noticed that the farm-bred cows calve every 14 months on the average.



KANGAYAM COW.

This breed responds to good feeding and bulls are ready for issue as breeding bulls at the age of $2\frac{1}{2}$ years.

The average milk yield for the foundation cows is 1,493 lb. with a daily average of 6.2 lb. The average yield of the farm-bred cows including several cows with one lactation is 1,615 lb. with a daily average of 6.6 in 241 days.

The highest yield recorded up to date is 4,105 lb. with a daily average of 10.9 lb. by cow No. 37, this cow has averaged for 8 lactations an average yield of 3,471 lb. with a daily average of 11.4 lb.

The average weight of calves at birth are—

Bull calf	...	...	...	...	...	46 lb.
Heifer calf	...	...	...	...	...	42 lb.

the highest weights being—

Bull calf	...	...	...	...	...	55 lb.
Heifer calf	...	...	...	...	...	62 lb.

A heifer calves on the average at the age of 3 years and 2 months, the average dry period being 184 days.

The average weight of a Kangayam bull is 1,000 to 1,100 lb. and of a cow is about 800 lb.



KANGAYAM SUCKLING CALVES, HOSUR.

Milk yields of some of the best cows.

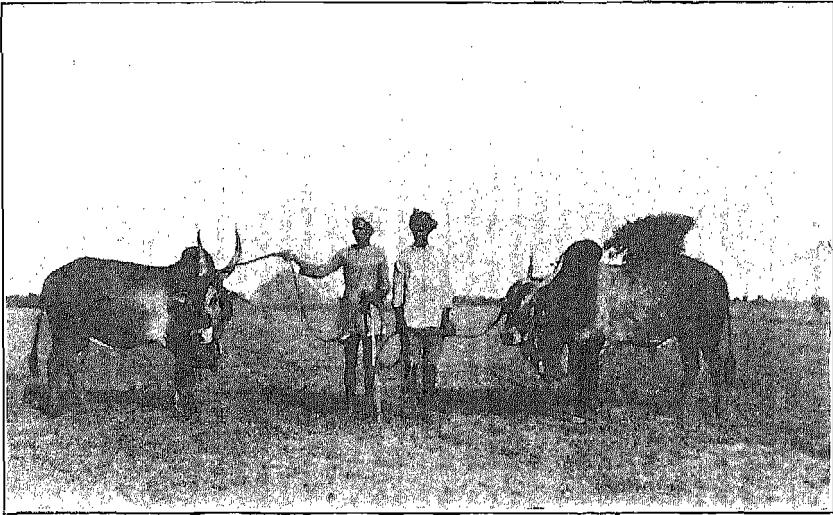
Cow number.	Age years.	Number of calvings.	Average milk yield.	Average daily average.	Maximum milk yield.	Average number of days dry.
			LB.	LB.	LB.	
9	12	7	3,074	8.8	4,076	160
14	13½	9	2,238	8.7	3,259	171
17	13½	7	2,742	9.5	3,365	186
20	14½	7	2,683	8.7	3,440	154
34	11½	8	2,811	9.3	3,640	87
35	12½	7	2,747	9.3	3,364	174
37	12½	8	3,471	11.4	4,105	89
38	12½	7	2,143	7.7	2,917	204
67	11	5	3,071	9.3	3,309	144
70	10	5	2,373	8.1	2,776	134
51	8½	4	2,552	7.3	2,732	165
55	8½	5	2,104	6.7	2,375	135
78	8	5	2,073	7.8	2,676	173
127	6½	3	2,383	8.9	3,143	240
155	4½	1	3,163	9.5	3,163	still in milk.
163	3½	1	2,450	16.9	2,450	do.
164	3½	1	2,585	10.2	2,585	do.

THE AMRAT MAHAL BREED.

Among the breeds found in Mysore the first place is undoubtedly due to the Amrat Mahal. The Amrat Mahal, literally Milk department, is an establishment for the breeding of a race of cattle peculiar to the country of Mysore, and the present cattle comprise the principal variety called Hallikar, from the district which originally produced them, and so distinctive is this breed that they may readily be distinguished from every other breed in India. The different breeds composing the present Amrat Mahal cattle owe their origin to the cattle of the tribe of Gollas and their sub-tribe of Hallikars who, with their superior cattle, are believed to have migrated in ancient times in several successive waves from the north, and settled in different parts now comprised in the Chittaldroog and Tumkur districts.

The *Karuhatti* establishment of the Vizianagar Viceroy (sometime between 1572 and 1600) at Seringapatam consisted of Hallikar cows imported from Vizianagram. This may be said to be the nucleus of the Amrat Mahal cattle. The Seringapatam cattle passed into the hands of the Wodayars of Mysore, some of whom, notably Shanraj Wodayar (1617 to 1636), Kanticava Narasa Raj Wodayar (1638 to 1658) and the celebrated Chikka Devaraj Wodayar (1672 to 1704) made their own additions to them from time to time, assigning "Kavals" in different parts of the kingdom. It was in Chikka Devaraj Wodayar's time that the cattle establishment obtained recognition as one of the departments of the administration. It was called "*Benne Chavadi*" or establishment of cows both as a breeding stud and to furnish milk and butter for the palace. He introduced for the first time the system of branding them with his initial ಡ (De). The accumulated herds of the Rajahs of Mysore passed on to Hyder Ali when he usurped the throne. In extending his conquest, and in reducing the numerous rulers who had held sway over more or less extensive tracts in Mysore, he acquired also the herds of the superior cattle belonging to them. Among these may be mentioned the Pollegars of Chittaldroog, Tarikere and the Rajah of Nagar. Hyder seems to have made extensive use of the cattle which he had appropriated in the movements of his army equipage, and is popularly credited with having kept at least 60,000 bullocks in different parts of the province though they were not organised as carefully or in as minute details as was afterwards done by Tippu, on a system which has, in essential points, been adhered to ever since. Upon succeeding to the throne of his father Tippu added to these herds those of the Pollegar of Hagalvadi, Chikka Devaraj Wodayar's and the suggestive name of "*Benne Chavadi*" was changed in his time into the more pompous one of Amrat Mahal from Amruta=Nectar.

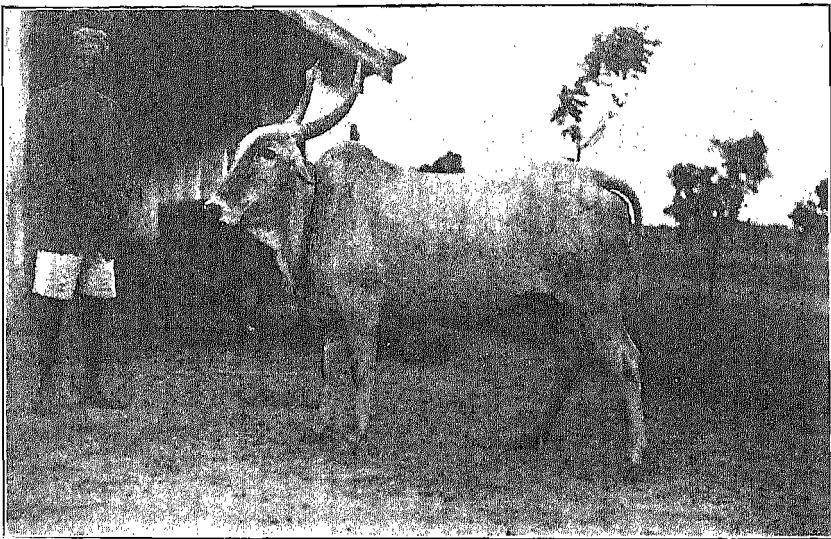
Tippu took great interest in these cattle and issued a "Hukum-nama" or regulations for the department, the greater part of which continued to be observed after taking Seringapatam and the same system was afterwards followed by the British Officers. The Dairy Department seems to have been on a large scale. The *Amildars* were expected to train the young bulls. These were given absolute freedom and were allowed to graze in the ryots' fields. They were afterwards classified when they were required as gun bullocks, pack bullocks and plough bullocks, etc. There was an annual muster of the herds, and Tippu frequently attended it in person and distributed rewards. Such was the composition of the Amrat Mahal cattle inaugurated by Chikka Devaraj Wodayar, reconstituted by Hyder Ali and thoroughly organised by Tippu Sultan.



AMRAT MAHAL BULLS.

The attention of the British was first called to the excellence of the breed when it enabled Hyder Ali to march 100 miles in two days and a half to the relief of Chellumbrum, and after every defeat to draw off his guns in the face of the enemy; and when Tippu Sultan was enabled to cross the Peninsula of Southern India in a month for the recovery of Bednore, and to march 63 miles in two days before General Meadows. It also enabled the Duke of Wellington to execute those marches of unexampled rapidity which are the admiration of Military men, and the Duke brought it prominently to the notice of the then Commander-in-Chief, Lieutenant-General Stuart. Captain Davidson, in a report on the Amrat

Mahal cattle attached to the Bombay column of the English Army in Afganistan in 1842 says: "No draught cattle in either army were so efficient as the 230 bullocks which accompanied the Bombay troops to Afganistan. It was entirely due to this very superior description of cattle that no part of the Bombay Park was required to be abandoned when the troops were returning to India over the almost impracticable roads through the Tirah mountains. These cattle were frequently upwards of sixteen hours in yoke. The draught bullocks of the Bengal army were the property of Government, and were not in my opinion as fine animals as the Mysore bullocks." Other memorable military events might also be cited to the credit of the Amrat Mahal cattle. It is said that during the Peninsular War, the Duke of Wellington often regretted that he



AMRAT MAHAL COW.

had not the services of the cattle of this breed. In 1808 the Commissioner of Mysore said of them: "They are active, and fiery, and walk faster than troops; in a word they constitute a distinct species, and are said to possess the same superiority over other bullocks in every valuable quality that Arabs do over other horses." Professor Wallace remarked in 1899 that the breed as a whole occupies among cattle a position for form, temper and endurance strongly analogous to that of the thorough-bred among horses.

On the fall of Seringapatam, the whole of the cattle became the property of the British Government, the management of the herds being allowed to remain with the Maharaja of Mysore on the

condition of his supplying a certain number of bullocks. It was probably imagined that the same attention would be given to the establishment as has been extended to it by the former Government, but Tippu Sultan had depended upon it for the efficiency of his army, and the new Government could be actuated by no such motive. The consequence was that the establishment was left to the servants who had charge of it, and by them neglected and abused; the British Government were disappointed in their expected supplies, and the cattle were allowed to degenerate to such a degree that after a period of thirteen years it became necessary to resume charge of it in order to preserve the breed from extinction. In 1813 the Amrat Mahal cattle, together with the pasture lands, were handed over to Captain Harvey of the Madras Commissariat. The herds then rapidly improved and doubled in numbers in the course of but ten years. In 1840 the Maharajah's Amrat Mahal herds and grazings were amalgamated with those of the British Government and, the whole placed under the orders of the Mysore Commission. In 1860 from motives of economy Sir Charles Trevelyan ordered the establishment to be broken up, and the herds to be sold; this appears to have been a fatal error, alike in policy and economy and the results were fatal to the public service. The price of cattle soon became prohibitive (Rs 150 each), and it was, with the cordial approval and assistance of the late Maharajah, re-established in 1866 by the purchase of such cows and bulls of the old breeds as were procurable in the Mysore country: very few were obtained owing to the Pasha of Egypt having secured most of the best blood. Fortunately, however, the late Maharajah was a large purchaser when the old establishment was broken up, and the Madras Government was able to obtain sufficient stock to fairly start again in 1870, the complement being 4,000 cows and 100 bulls.

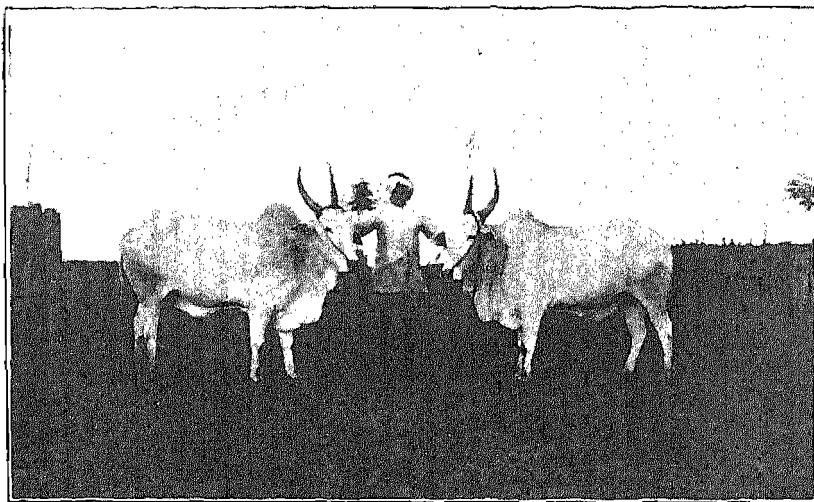
In 1883 the British Government handed over this valuable property to the Government of His Highness the Maharajah for two and a quarter lakhs. It is now entirely under its control, and every effort is made by careful elimination of doubtful stock to restore the old breed to its former excellence.

Stud books have been opened, and the cattle are mustered by name and brand. Births and deaths are registered and reported in monthly returns, and frauds on the part of subordinates have been to a great extent prevented. The Madras Government were receiving from the establishment 200 bullocks annually. The need for this supply having closed after the advent of motor transport, the stock was reduced from 12,000 to 6,000 and the control of the Amrat Mahal Department which was under the Mysore Military authorities was transferred to the Director of Agriculture for Mysore.

As has already been stated the cattle of this breed originally comprised three varieties; 1. (a) Hallikar, (b) Hagalvadi and (c) Chittaldroog. Prior to the abolition of the department in 1860, the several herds seized by Hyder and Tippu Sultan seem to have been maintained for the most part unmixed as separate "Serves,"



HALLIKAR BULLOCKS.



AMBAT MABAI BULLOCKS.

the distinguishing peculiarity of each breed being thus kept unadulterated. In 1866 when the department had to be reorganized by repurchasing the stock it was found impracticable to get back in their original purity all the cattle sold six years before. At this juncture the men, to whom the work of collecting the cows was entrusted on promise of appointing them "Serwegars," freely mixed the three main varieties of the old Amrat Mahal. A large number of inferior cows of every other breed, including their own bred cattle known as "Swant Gosu" (mixed breed), and a large number of the Mahadeswarabetta cows are also said to have been passed off for the reconstruction of the Department. During recent reduction and reconstitution of "Serwes," since 1877, many herds have been broken up and distributed among others, new herds have been formed out of the excess stock of the old ones, and exchanges of stock are often being made between different "Serwes" all tending to promote mixture. At present the Amrat Mahal breed cannot be said to be as pure as it was prior to 1866, although careful selection and uniformity of treatment in recent years seem to have erased a good many points of difference, which must have necessarily existed at the time of reconstitution of the herds in 1866. Stricter selection is now being continued under the Livestock Expert. The different breeds of Hallikar, Hagalvadi and Chittaldroog varied but slightly, their general characteristic being the same. Some special characteristics developed by local peculiarities in the different herds may however be noticed. The cattle reared in the "Kavals" or reserved pastures are of much larger size than those found in the North. They are more bony, carry thicker and rather less gracefully set horns, having comparatively thicker tails. Their hoofs are said to be not so tough as those of the cattle in Chittaldroog from which they differ in having a somewhat pendulous sheath and dewlap. The cattle in the Tumkur, Hassan and Kadur districts, though slightly smaller in size are very much like those of the Amrat Mahal. The herds of the eastern parts of the Chittaldroog consists of cattle of smaller size but more compact and hardy frame with a finer tail, thinner and more gracefully set horns, and stronger hoofs. The cattle of the Western Chittaldroog and Channagiri taluks resemble the last named variety, and differing from them only in being slightly bigger in size.

The Amrat Mahal cattle are kept in their grazing grounds which are called "Kaval" about 210 in number and these are distributed over the greater portion of the western and central parts of Mysore and cover an immense tract of country. They comprise varieties of soils, often undulating and covered with scrub jungle growth. The cattle feed on various grasses, though "vunaga" (*Heteropogon contortus*) is by far the most predominant. The grazing in the Kavals situated in the valleys is most

nutritious. As the country becomes more elevated the grass becomes more scanty, and inferior in quality. The "Kavals" are divided into (a) hot weather, (b) wet weather and (c) cold weather Kavals, according to the season of the year at which they are most suitable for grazing. The hot weather "Kavals" are generally in the beds of tanks in which grass springs up during the hot months, and where generally there are trees capable of affording shade to the cattle during the heat of the day. The cold and wet "Kavals" are those where grass dries up during the hot weather. The cattle are driven for about four months in each year from May to September to those "*Malnad Kavals*." The herds in the west are taken to the south-western jungles on the Coorg Frontier, and those in the north to Lakkavalli and Channagiri forest "Kavals" in the Kadur and Shimoga districts; where the first showers of the advancing monsoon ensures an early and abundant growth of grass. They then turn to their maidan, or plains "Kavals" about the beginning of September in each year when the supply of grass is plentiful all over Mysore.

The whole of the cattle are divided into "Serwes" or herds, each of which, with attendants attached to it, is kept separate and distinct. The establishment of each herd is fixed at one hundred breeding cows, one hundred heifers, five bulls, with the calves of both sexes and all ages, the actual produce of the herd the number of which varies according to circumstances; but which generally speaking, raises the total number of animals in each herd to three hundred head. Each "serwe" or herd is placed in charge of a "Serwegar" assisted by two "Mundals" each of whom is responsible for the proper management of cattle under his charge. An establishment of graziers and other attendants is likewise attached to the herd. The number of "Kavals" allotted to each herd varies from three to nine according to the size of the "Kavals" and the quantity of pasturage they afford, and although the herds are not supposed to be permanently attached to particular "Kavals," still they are not removed from those which have been allotted to them without special reasons. The whole of the herds are divided into "Tukries" or divisions, some composed of two and others of three herds the "Kavals" belonging to each herd being, of course, conveniently situated. Each Turki is placed under the superintendence of a "Daroga" whose duty it is to frequently inspect the herds, to muster the cattle, to check, and report all irregularities on the part of the attendants in charge of them, and also to arrange as far as may lay in his power any difference which may rise with the inhabitants or local authorities. At the annual inspection of the cattle, which takes place in the vicinity of the grazing farm in the months of July and August each herd is separated, carefully examined, all inferior cattle removed, and unmarked cattle branded.

As may be gathered from the foregoing, the cattle of these herds are kept in a semi-wild state. They are kept in the open, and all the protection or shelter they are afforded from the midday sun and rain is that of trees. They roam about in unrestricted freedom in their vast "Kavals" to the great benefit of their health and limbs. This mode of treatment and rearing in a state of nature kills weaklings, and produces a hardy stock barely possible in an artificial method of breeding. The cattle being thus brought up in a hardy fashion and segregated from village cattle are very rarely attacked by the several forms of contagious disease.

In disposition, the cattle are wild, unruly and impatient of the presence of strangers; it requires several months of kind treatment and patience to break them in. For days together they are kept on starvation allowance of fodder, and when they are weak and subdued they are gently handled by the keeper to whom, by degrees, they become accustomed. They require to be gradually habituated to the yoke, and harsh treatment only makes them stubborn.

Early castration is the rule in the department, and the calves are castrated when they are eighteen months old in the cold season.

The bullocks are sold when they are about 3 to 4 years of age. They are in their full vigour at five years, and past it at twelve. They work until they are fourteen or fifteen, after which they rapidly decline and die at about eighteen years of age.

As dairy stock, the cows are insignificant, being very poor milkers. The whole of the milk is fed to nourish the calves and in a lot of cases this is not sufficient. Good cows yield about two seers daily (approximately 5 lb.). The milk is very rich and sweet. It is said that heifers in the Mysore district generally give birth to their first calf in the sixth year and are termed Mukkundies. In the Hassan, Tumkur and Kadur districts, they reproduce for the first time in the fifth year, and are then said to be Ikkundies. Those in the Chittaldroog district and Channagiri taluk are regular "Varshakundies—" that is, they commence calving in their fourth year. This information is, I feel sure, very unreliable as circumstances alter cases very considerably. Provided that the heifer is well-fed she will probably come in season at the end of 24 to 30 months and generally speaking in a year of good rainfall the heifers come into season earlier. About forty cows are allowed to one bull. The bull is not used until he is four years old, and is said to retain his vigour until he is 9 to 10 years old, after which it is castrated and discarded from the herd. It is said that cows, although in good condition, do not come into season while in their Malnad "Kavals" owing to exposure to rain and

wet, but when they are turned into their "Maidan Kavals" they breed in large numbers. The most favourable time for breeding is when the pasture and water are abundant and most favourable months for births are January and February, and from August to December.

The calves remain with their mothers during the day but are separated from them at night and are sheltered in folds. When they are three months' old, they are able to graze and commence to partly subsist on pasture. In the cold season when the herbage is abundant, they are generally weaned when five months old; such as are born later in the year cannot be separated from their mothers until after the hot weather. After separation, care is taken to conduct them to the richest pastures in the neighbourhood but they are not supplied with food beyond what they can graze on pasture.

The average prices may be stated as follows:—

Very good breeding bulls Rs. 200 to Rs. 300; average bulls from Rs. 150 to Rs. 200. Very good cows Rs. 60 to Rs. 90, average cows about Rs. 45. Col. Gunn states in his book that a pair of first-class bulls are said to have fetched in Hyderabad as much as 500 and even Rs. 800, and in Dharwar Collectorate that a pair of bullocks was sold for Rs. 800 having won a race in dragging a heavily laden cart through sandy soil. The average price of a pair of average Amrat Mahal bullocks to-day is from Rs. 180 to Rs. 200.

The "Serwegars" of the Amrat Mahal Department have been allowed the privilege of keeping their own cattle with the Government herds with the consequence that the Amrat Mahal bulls have crossed the Nadudana cows and the result has been grading up, and these, from long association, have taken on all the characteristics of the Amrat Mahal. They are now known by the name of Egesu or Swantagosu cattle.

With a view to improve the breed which has undergone deterioration by haphazard breeding, and to produce good breeding bulls and make them available in a domesticated condition for improvement of cattle, a breeding station has been opened at Ajjam-pur in 1929, where a herd of five hundred Amrat Mahal cows are maintained and bred on scientific lines. Suitable breeding bulls produced on this farm are sold to village panchayats and other breeders at Rs. 200 each.

It may be of interest to know what the breeding experts consider to be the best points of a Mysore bull of the best quality, and these, though they cannot be met with in a single specimen are more or less searched for in all careful selections—

(1) A long and stretching frame.

(2) A good height—say 52 inches measured behind the hump.

-
- (3) A long and tapering head, with a narrow and prominent forehead.
 - (4) Small but prominent and bright eyes.
 - (5) Small and erect ears.
 - (6) Thin, fairly long and graceful set of horns, the difference between their thickness at the base and at the end being small.
 - (7) Strong, fairly long neck with a small well-shaped hump.
 - (8) Thin and short dewlap.
 - (9) Broad and full chest.
 - (10) Well formed and strong shoulders and hind quarters.
 - (11) Strong and well rounded ribs.
 - (12) Level back and broad loins.
 - (13) Narrow flanks.
 - (14) A level croup; an abruptly falling croup being condemned ("good rumped" in horsey phraseology).
 - (15) A thin short whip like tail reaching to or very little below the point of the hock.
 - (16) A well projecting anus ring, so that the ejected dung may fall clear of the body. It should not be situated in a niche-like hollow, as in cows and old animals.
 - (17) A sheath having a little or no pendulous growth.
 - (18) Legs of medium length and well proportioned having strong and fairly thick bones and moving with a swing in perfect rhythm, and straight not turned sideways or brushing against each other.
 - (19) Short fetlocks, and hard and small hoofs with equal halves having a very narrow cleft between them. A long shank bone is considered a weakness.
 - (20) The colour of the horns, hoofs, muzzle and skin should be black.
 - (21) The skin should be thin and satiny, having short and soft hair. Bluish and iron grey colours are preferred.
 - (22) A compact body free from all pendulous growths.
 - (23) The animal should be sound in every way, of symmetrical features, of good temper and pure breed, and free from hereditary diseases. In the selection of the cow no such special attention is bestowed as in the case of the bull, which, considering the number of animals it is likely to influence is most carefully selected. The main points looked for, in cows are good size, length, shapely head, and horns, broad hips and loins, and nice colour.

HALLIKAR BREED.

The history of this breed has already been given under the head of the Amrat Mahal cattle of which the Hallikar breed is the most important and valuable member. An absurd legend is current amongst the herdsmen of the department regarding the origin of the Hallikar. They state that Hyder Ali, after one of his trips to the south, brought back to the Mysore country a number of cows of the small Brahmini caste. These cows were turned loose in a 'Kaval' in the Tumkur district in which there were great numbers of antelope, and a cross between the big black buck and the small Brahmini cows gave rise to the present Hallikar breed. In support of this statement they point to the small spot below the inner canthus of the eye which is common to the antelope and the Hallikar cattle. A similar statement was given to me regarding the Burgoor Hill cattle in the North Coimbatore district, the colour being red with white spots. It is curious that while the name of Gollas has disappeared among cattle, that of Hallikar, their sub-tribe, has survived in the cattle which they introduced into Mysore.

Hallikar cattle, besides chiefly comprising the Government Amrat Mahal herds, are to be found in Tumkur, Hassan and Mysore districts, the chief centres being parts of the Nagamangala, Kunigal and Gubbi taluks. The area over which the breed prevails is not by any means extensive, and it is thinly scattered even within these limits. The reason is that there are no extensive pasture lands in the habitat of these cattle, and the tracts being populous they are mostly homefed and not maintained in large numbers except by a few breeders in the taluks just named. They are frequently bred by small ryots who have only a few cows, and special attention is paid to the mating of the cows and the rearing of the young stock.

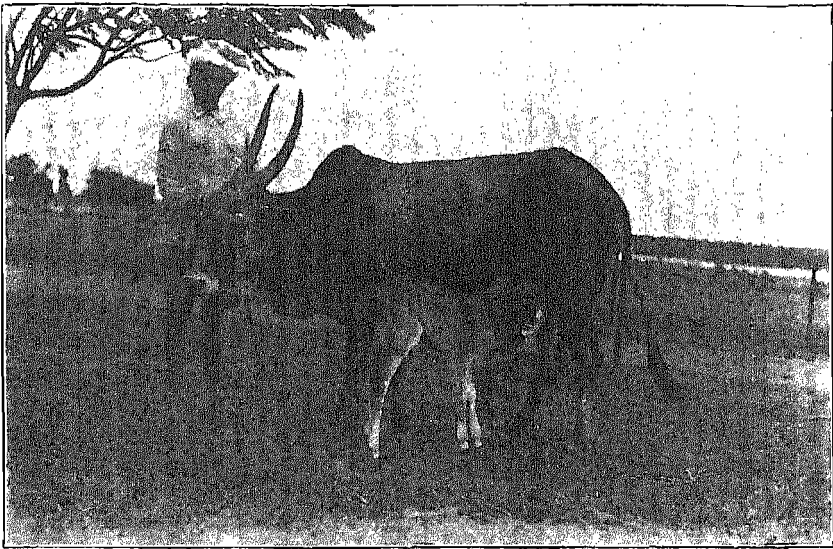
Mr. Wallace in his "India in 1887" gives an excellent description of the breed :

The head is well shaped, long and tapering towards the muzzle which is generally black. the forehead bulges out slightly and is narrow and furrowed in the middle. The horns are unique in shape, and differ considerably from most other breeds. They are usually large, set well back on the crest of the frontal bone; springing close together, they diverge inclining backwards each in a straight line for nearly half their length, and then with a gentle and graceful sweep bend forwards usually lightly inclining inwards towards their points, which are black tipped and exceedingly sharp. At times when the head is down, as when feeding, the horns can almost touch the neck in front of the hump. They thicken gradually as the head is approached, and are very strong near the base which seem to extend, apparently to give strength, down

the forehead between the eyes as a distinct ridge on each side, thus forming a perpendicular groove or depression in the centre of the forehead.



HALLIKAR BULLS.



HALLIKAR COW.

The colour is of a more or less uniform grey, varying from light to a deep iron grey with a darker shade over the shoulders and hind quarters. Broken colours are being carefully weeded and sold. The neck is thin, for the size of the cattle, but is long and sinewy. The dewlap is thin, and does not extend very far back. The ears are small and taper to a point, being carried in a horizontal position.

The hump is well developed in the bull. The tail is thin and tapers like a whip. The legs are clean, strong and sinewy, standing well apart. The hoofs are small, well formed, black and hard, with a very close cleft between. This breed seldom attains a very large size. In shape they are remarkably neat, with muscles like whipcord.

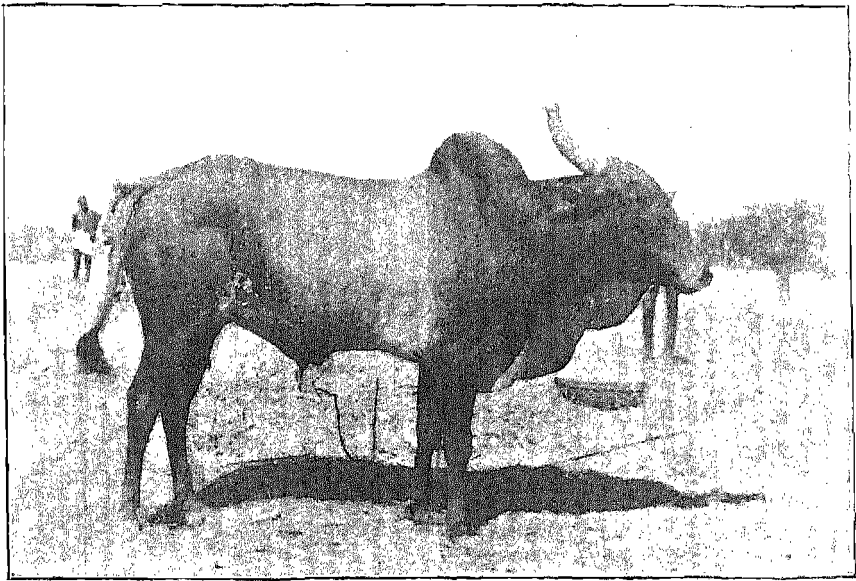
The cows have a very muscular appearance and vary only with having a thinner hump and horns. In colour they are invariably of a light grey. They have a small compact udder with small and hard teats. They are poor milkers, though the milk is rich and sweet with a high percentage of butter fat. They are of high mettle, and, though mostly homebred, are not gentle or tractable.

There is always a great demand for these cattle, and the number annually produced is not sufficient to meet it, higher prices prevail. The average market value is: very good breeding bulls, Rs. 200 to Rs. 550, average bulls Rs. 150 to Rs. 200; very good cows Rs. 80 to Rs. 100, average cows, Rs. 60 to Rs. 70; bull calves of one year from Rs. 20 to Rs. 40. A pair of bullocks realize on the average from Rs. 250 to Rs. 350.

Gajamavu is the most valuable variety of the Hallikar breed and it is to be found at Karadahalli in the Nagamangala taluk. Good Gajamavu cows of this locality are little different from the Amrat Mahal cows. The shape of the head, face, muzzle, eyes, ears, horns, neck, legs and barrel is exactly of the same type. The similarity extends even to the masculine look of the cow. One peculiar point which is very highly prized in this variety is the very long back which is supposed to give them a greater mechanical strength and advantage. The cattle owners of Karadahalli treat their animals after the fashion of the Amrat Mahal Department, they send their herds to distant jungles in the Heggadevanakote taluk for the benefit of the early season pasture.

Superior bulls are kept at Karadahalli for breeding purposes. Cows, even from distant places, are taken to these bulls for service upon payment of a fee Re. 1 to Rs. 4 for each service. It is said that so highly are the Gajamavu prized that ryots of the neighbouring taluks of Mandya, Seringapatam and Closepet advance to the breeders of Karadahalli Rs. 50 to Rs. 100, for calves still in

the mother's womb. If a cow-calf is dropped the advance is returned, as it is not customary for the breeders of Karadahalli to sell the cows of their breed. If a bull-calf is born it is sold according to the original agreement. In some cases such sales are subject to the provision that the calf should be reared for two years, and resold to the original owner for its full value at the time of its resale which is usually from Rs. 100 to Rs. 200. This system of selling and reselling is a common custom and it affords a convenient division of labour. The Karadahalli bulls do not attain a large size, the average height being 49 inches measured behind the hump. They are difficult to tame at first but when once tamed they are far more amenable to being handled and worked by men than the Anurat Mahal cattle which, to the last retain more or less their impatience of strangers.



ALAMBADI BULL.

Pennagaram district.

THE ALAMBADI BREED.

(Sometimes called Mahadeswarabetta.)

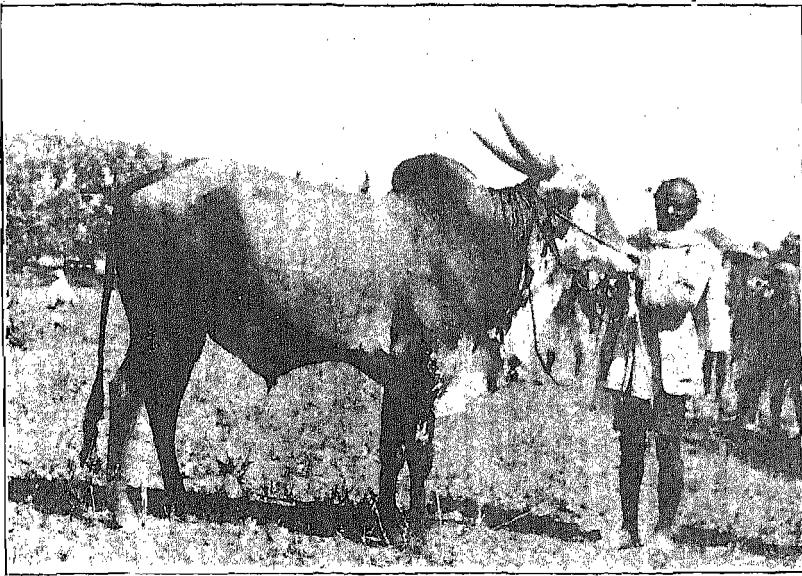
This breed derives its name from its chief and fountain market Mahadeswarabetta in the Kollegal taluk of the Coimbatore district,

where two large cattle fairs are held in February and in October at which cattle exhibited are mostly of this description. It is also called the Bestal or Cauvery breed from its hilly home on both sides of the Cauvery, but probably a more common name is that of Alamjadi called after a village of that name on the bank of the Cauvery; this village no longer exists and Alamjadi is just a penning place for cattle. The chief habitat of this race of cattle is in the Kankanahalli taluk of the Bangalore district, and the northern taluks of the Coimbatore and Salem districts which are divided by the river Cauvery from Mysore. The reason for these regions teeming with great herds of cattle is the wild expanse of forest land which is scarcely fit or has not yet been taken up for cultivation, and with only patches of tillage in favoured places, and affording herds of cattle abundant pasture and wide and unrestricted roaming ground. The tracts are stony in elevation and humous in the valleys. The forest growth being all desiduous, the pasture lands are thoroughly baked in the hot weather by the heat of the sun so peculiarly intense in the valleys in the low hilly regions. Another reason, though of secondary importance, is the noble stream of the Cauvery whose waters are utilized for irrigation higher up in Mysore and fertilizes some of the richest tracts in Southern India lower down, and which runs in these regions through scenery of wild grandeur on a bed too deep for irrigation purposes, and affords cattle a perennial supply of water in seasons when the country becomes parched up and thirsty.

Beyond these jungle centres, but bordering on them, large herds of this breed are also kept in villages commanding extensive pasture. Cows and bulls of this breed, in small numbers, purchased from the large herds are taken away and reared in "Maidan" villages of the Kolar, Bangalore and Mysore districts. It is from these breeding tracts that all the cattle of this kind are exported to other districts, and to foreign ports such as Penang, Singapore, Java and Colombo. An average of nine thousand large powerful animals were exported from Negapatam to Penang 20 years ago. A large number of cart bullocks used in Southern India are obtained from this source. The whole habitat of the breed is favourable to the development of bone.

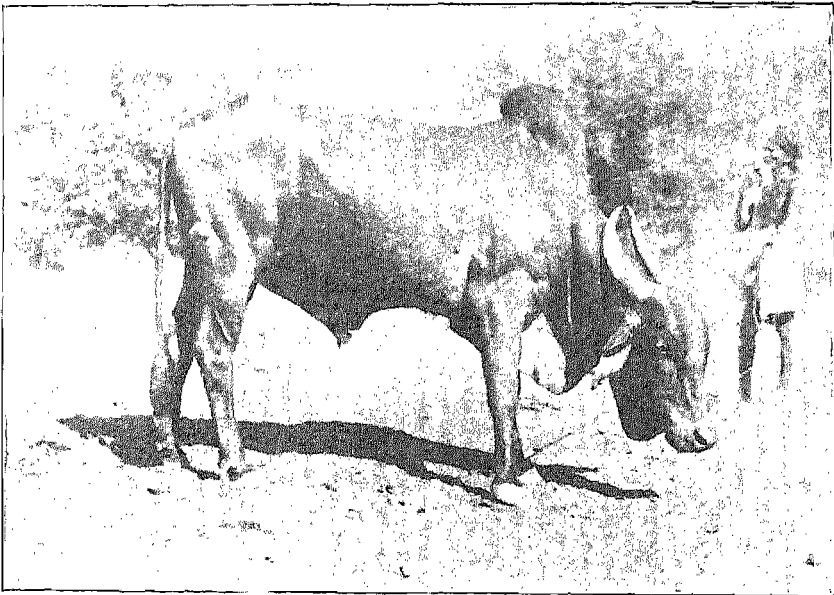
The breeding area proper is comprised of the desiduous forests of east and south Kollegal and North Bhavani taluks of the Coimbatore district and South Hosur and West and South-west Dharinapuri taluks of the Salem district, as well as the adjoining territory of Mysore. The cattle which are found here are all the same type, viz., "Malai-Madu" or hill cattle, though certain variations are recognized, which are largely due to environment and different conditions of breeding and rearing. Formerly the cattle of these hills

wandered throughout the tract, at the will of the graziers, wherever most suitable pasture was found, and there was frequent interchange of breeding bulls. Even now, Kollegal breeders frequently introduce fresh blood into the herds by the purchase of breeding bulls, either from "Pennagaram" herds or from Malluvalli in Mysore. The cattle of the Burghur hills in the North Bhavani are recognised as a separate breed. They are smaller, lighter and quicker than the main breed and are often of broken and mixed colours. The difference is, probably, due to the fact that not the same care is taken in breeding here. The cattle of North Satyamangalam are again a degraded type of these hill cattle, due to



ALAMBADI BULL, BRED IN HOSUR TALUK.

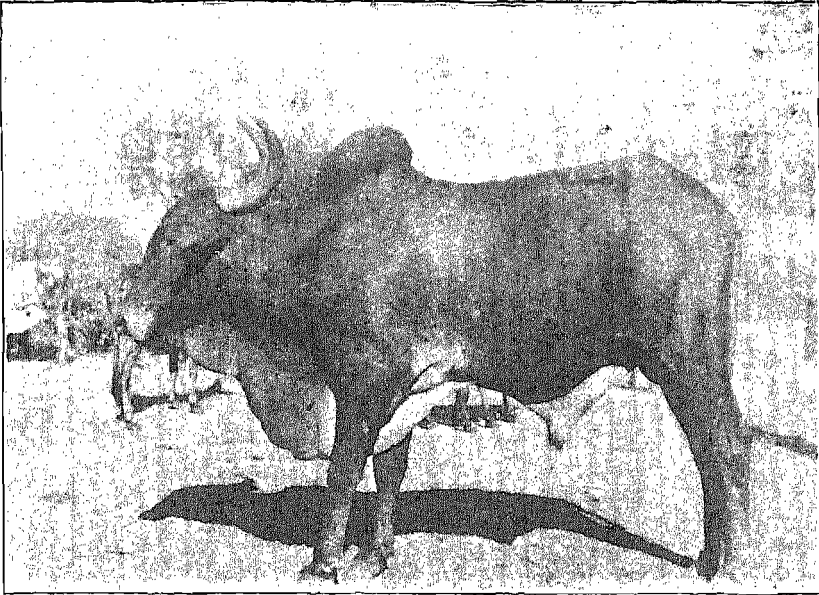
mixed grazing and scarcity of pasture in the lowlying forests adjoining the villages. The cattle north of Denkanikotta in the Hosur taluk are also known as an allied breed. These are hardly forest cattle now, but are bred by ryots in the villages who often own their private grazing grounds. These are described as "Masti" and "Nundi" dana and are very similar to the domesticated cattle of neighbouring Mysore territory. The cattle of the breeding tract are, however very similar. Those of Pennagaram side are said to be of bigger frame but no other difference is recognized. These are known commonly by the name of "Alambadis" "Salems," "Mahadeswarabetta," "Cauvery Valley" cattle;



ALAMBADY BULL AT HOGANAİKAL.

though in different districts of the South, the bullocks are known by different local names, very often being called by the name of the fair at which the animals are bought.

In the regular breeding tract, all male calves are sold when young, i.e., under one year old, and these are taken by dealers to recognized rearing tracts chiefly in North Salem, West Chittoor and the adjoining Mysore territory. Ryots of North Coimbatore also visit the Gettisamudram fair in Bhavani, as well as the breeding villages in the hills, and buy large numbers of calves for rearing. West Coast dealers visit the fairs of Dharmapuri and take away calves to the West Coast for rearing. Thus in the breeding tracts, male stock are seldom seen: most of the agricultural and draught work is done with cows. The only cattle seen in the forests are cows with their young, young female stock, and breeding bulls. It is usually stated that one bull is required for every fifty cows but nowhere were the bulls kept in this proportion, nor are they necessary, since these cows seldom calve more frequently than once in two or three years. The breeding herds live in the forests for the greater part of the year, where they are kept in pens at night time. They are brought back to the villages at harvest time, when the harvested fields provide pasture for some time and the cattle supply the necessary manure for the succeeding ragi crop. After



ANOTHER TYPE OF ALAMBADI BULL IN PENNAGARAM DISTRICT—A LOOSELY BUILT BULL AND A SLOW WORKER.

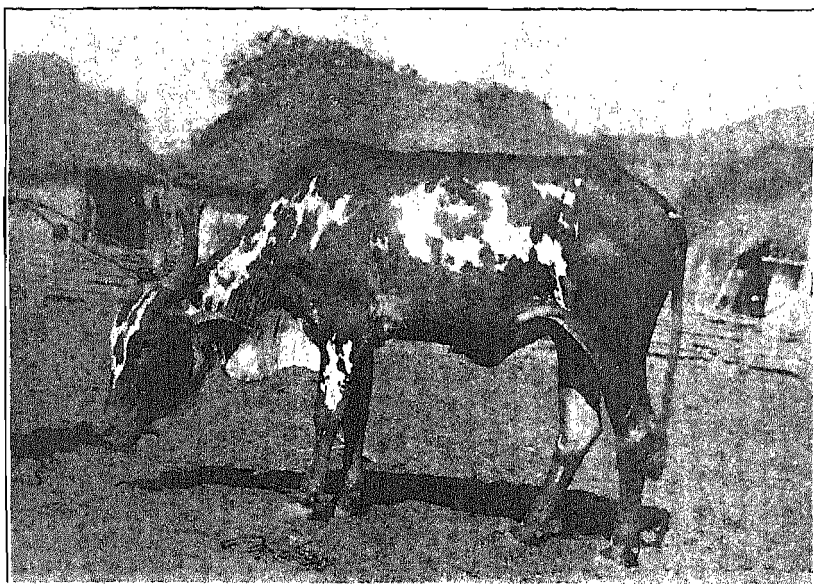
this source of grazing is exhausted, the cattle again return to the forests. Except for this, cows are only brought into the villages, when they are too weak or emaciated to keep with the herd, or immediately after calving until the calf is old enough to follow the herd. Occasionally, when the village is located near the forest pasturage, animals return to the village every night. The breeders of these cattle, except on the Hosur plateau, cannot be considered as ryots. They certainly grow crops for their own requirements, but by profession, they are breeders of cattle, depending on the sale of their calves for their livelihood.

Mr. Sampson stated in 1917 that : " Within recent years owing it is stated, to the stringency of forest regulations, the breeders' lot has been anything but a prosperous one, as the following figures, taken from the cattle census records for the principal cattle-breeding villages of East Kollegal, will show a decrease in five years of over 40 per cent from Fasli 1314 to 1319." But figures obtained from the cattle census records for Fasli 1334 and 1339, which are also incorporated in Mr. Sampson's statement below, show that the number of cows maintained in these villages is steadily increasing again and in some villages have exceeded the figures for fasli 1314.

Name of village.	Mr. Sampson's figures.		Present figures.	
	Number of cows Fasli 1314 1904-05.	Number of cows Fasli 1319 1909-10.	Number of cows Fasli 1334 1924-25.	Number of cows Fasli 1339 1929-30.
Mahadeswarabetta (Suluvadi) ..	4,809	2,721	2,561	3,493
Dentalli	709	635	709	617
Ponnachi	2,678	1,185	1,107	1,889
Ramapuram	865	855	1,093	1,844
Satyamangulam (Koggalam) ..	1,080	449	903	1,259
Kuratti (Osar)	1,459	808	1,654	1,686
Pudunagaram	732	775	783	877
Budranalli	1,461	726	889	1,067
Total ..	13,793	8,154	9,699	12,732

The breeding villages of the Hosur taluk have however, shown a corresponding increase from fasli 1314 to 1319, the total number of cows for sixteen of the principal breeding villages having risen from 7809 in Fasli 1314 to 18,375 in fasli 1319. For the whole of the Hosur taluk it is seen from the 5-year cattle census return that the number of cows has increased from 73,617 in Fasli 1334 to 93,905 in Fasli 1339, an increase of over 20,000.

Writers have not agreed on the description of this breed. In 1901 Lieut. Holmes states that these cattle are a variety of the

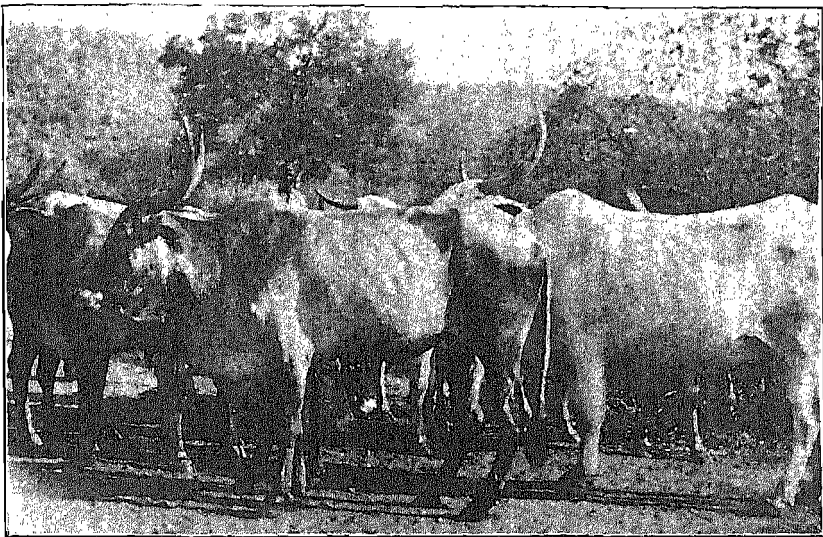


ALAMBADI COW.
(Hogunaikal.)

larger Mysore cattle the "Doddadana" and are akin to the Annat Mahal, Hallikar and Chittaddroog breeds. Bullocks of this breed are generally docile and easily trained. They are not fast trotters; but are suitable for heavy draught and are better at road work than Nellore bullocks. The head is moderately long and is characterised by the very prominent forehead, the horns slope backwards with a forward slope towards the upper half, this gives the face a long appearance, ears are long and pendulous, dewlap thick and deep and continued almost to the sheath, body massive, of moderate length with good girth and heavy shoulders; back—of moderate length and rising slightly towards the croup; sheath—not pendulous prevailing colours are white and grey.

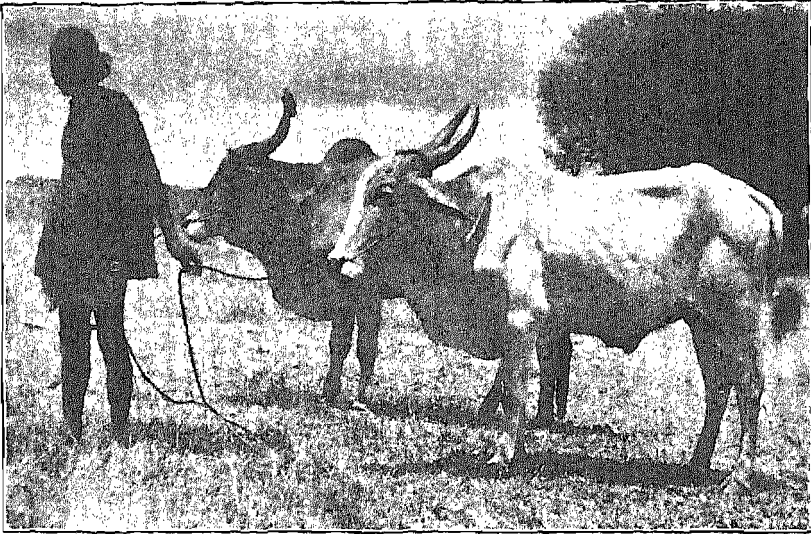
Col. Gunn in 1909 in his book "Cattle of Southern India" states that these cattle are more massive and are of larger build than those of the Mysore type found elsewhere, though they are often found wanting in their symmetry of form. A good specimen should have the following points:—

Head—Short and stout with thick muzzle and broad forehead; colour frequently black and many also may be light reddish brown, but the majority I have seen are white; dewlap thick, broad and in folds sometimes continuing backwards to the sheath; ears long and generally erect; back is seldom straight and usually inclines from the croup to the "cow-lick" and from there rising to the hump; sheath deeply pendulous.



ALAMBADI COWS NEAR HOGANAUKAL.

Comparing these two descriptions, one says the head is moderately long, and the other says it is short and stout; one says the ears are long and pendulous and the other long and generally erect; one that the colour is frequently black and the other grey and white; one that the sheath is not pendulous and the other the sheath is deeply pendulous.



ALAMBADI WORK BULLOCKS.
(Bred near Pennagaram.)

After my visit to the breeding areas around Hogainakkal and Pennagaram, Royakotta and the district north of Denkanikota, I have come across both specimens and have reproduced in this book, photographs of the types of bulls found in these areas. The large black bull is similar to the build of the Ongole, it is fairly massive and loosely built and is slack looking in its appearance; it is not a fast walker, there may be some Anurat Mahal and Ongole blood mixed up in it, the other two types are more compact looking animals and they move much quicker, they are not so massive and I am of the opinion that these are the better type and are much more in demand. It is well known that most of these animals graze in the forests in North Salem and North Coimbatore and that a number of Mysore cattle also graze there, and it is my opinion that the breed has become mixed with Mysore blood. Breeders even here admitted this to me, they say that they prefer a grey bul or a sandal colour meaning fawn, also that a tight sheath is preferable to a pendulous one. The cows are compact animals and have not this looseness about their build. Some have a fold of skin in

the position of the sheath and others have not. The colours are iron grey, grey, fawn, brown, etc. Some have a flesh coloured skin and others a dark coloured skin, some have a light coloured muzzle and others a black muzzle. Most of the animals inspected in these areas are slightly smaller than the Mysore breeds and have shorter horns.

Almost all the bull calves and a few heifer calves are sold at about a year old, bull calves realize on the average Rs. 15 to Rs. 20 each; heifers Rs. 5 to Rs. 10. The cattle from all the villages around Dharmapuri, Krishnagiri, Palakode, Royakotta, etc., are sent to the forests to graze from July to January each year. The animals generally exist on grazing and dry fodder. Bulls 3 years old are given a little concentrated food and are ready for work at 3½ to 4 years. Some breeders state that some of the cows calve every 16 months and others every two years; this depends on the season and monsoon. They are all poor milkers. A good number of breeding bulls are dedicated; they live in a semi-wild state and are never tied up and so are uncontrollable.

This is a breed which could be improved without much difficulty, the cattle are hardy and healthy and exist on meagre rations. The cows in this tract are used for work purposes for ploughing, threshing, etc.

A good bull of this breed in my opinion should have the following points :—

Head—Moderately long and is characterised by a fairly prominent forehead, horns should slope backwards with a forward slope towards the upper half and should be about 10 to 15 inches in length, they should be close at the roots and gently spreading out above; black muzzle.

Ears—Long and generally erect.

Eyes—Prominent and mild.

Neck—Short and thick.

Hump—Well developed and fairly large.

Dewlap—Fairly thin, extending to sternum or just beyond.

Body—Deep and compact with well sprung ribs and good girth and heavy shoulders.

Back—Fairly long and slightly rising towards the croup.

Quarters—Narrow and sloping from the croup to the tail.

Sheath—Not pendulous.

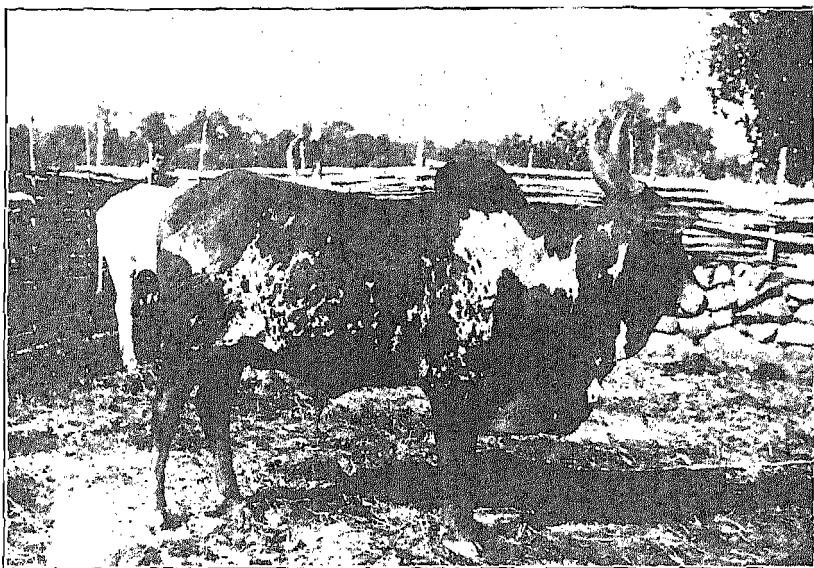
Tail—Long and tapering.

Legs—Short, strong and of good bone.

Feet—Large and hard with prominent coronary band.

Colour—Iron grey, grey and fawn.

Skin—Dark brown.



BARGHUR HILL BULL (6 YEARS).

BARGHUR HILL BREED.

These cattle are bred extensively in the district round the Barghur Hills in the Bhavani taluk of the Coimbatore district. They are chiefly born and reared in the forests.

They closely resemble the Hallikar variety of the Mysore breed. In many respects they differ from the Alamبادi cattle. They are of smaller size, more compact and more attractive. They have not got the very prominent forehead of the Alambadys. They are very restive and fiery in disposition and are difficult to train. For spirit, power of endurance and speed in trotting, they are said to be unsurpassed.

It is apparent that the breeders do not bestow sufficient interest in their breeding. They informed me that they prefer a bull with a tight sheath and of a greyish colour for breeding purposes. I inspected seven or eight breeding bulls within a radius of a few miles of Barghur and not one of those bulls had a really tight sheath, they were all slightly pendulous. The cows are very poor milkers. The cows are white, red and white, red with white spots, and dark brown in colour. The white animals have a flesh coloured skin. The breed may be a cross between the Hallikar cattle of Mysore and the red country cows from the plains. The cows are said to calve on the average every 16 or 18 months and there are a number



BARGER HILL COW.

of cows which are said to calve every year. All the cattle are driven to the salt licks about 27 miles north of Barghur about January for a few days and then they are driven to the forests again.

A pair of very good bull calves at a year old, will realize about Rs. 100, the average price being 3 to 4 bull calves for Rs. 100 at about one year old. A good bull will cost about Rs. 150. There is little demand for cows, the price ranging from Rs. 30 to Rs. 40 each at the most.

Description.

Head is well shaped, long and tapering towards the muzzle, the forehead is slightly prominent and has a deep furrow between the roots of the horns, eyes are fiery, ears are moderately long and upright, horns are of average length inclined backwards with a forward curve, close at root but spread above and sharp at the tips.

Neck—is fairly long, thin and sinewy.

Hump—moderately developed.

Dewlap—thin, small and does not extend beyond the sternum.

Body—compact with good girth and well ribbed up.

Back—of moderate length and level.

Quarters—narrow, slightly drooped.

Sheath—not pendulous.

Tail—thin and tapering; not long.

Legs—short and hard.

Feet—Small and compact.

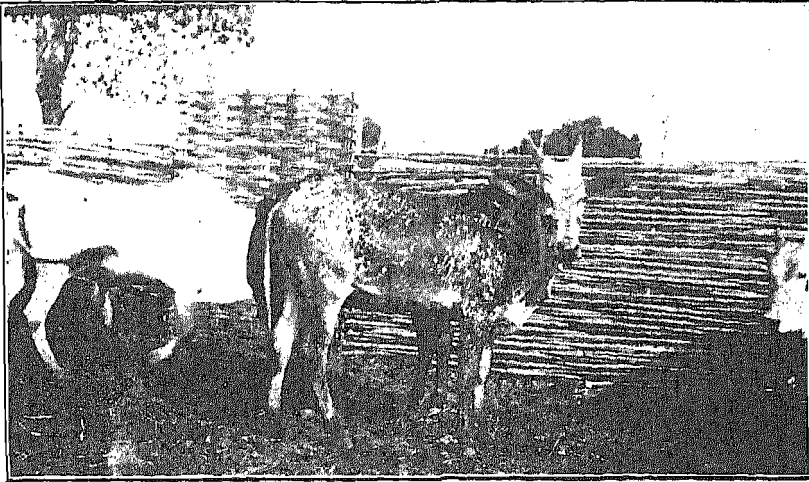
Colour—White, grey, red, red with white spots.



BARGUR HILL COWS AND HEIFERS.



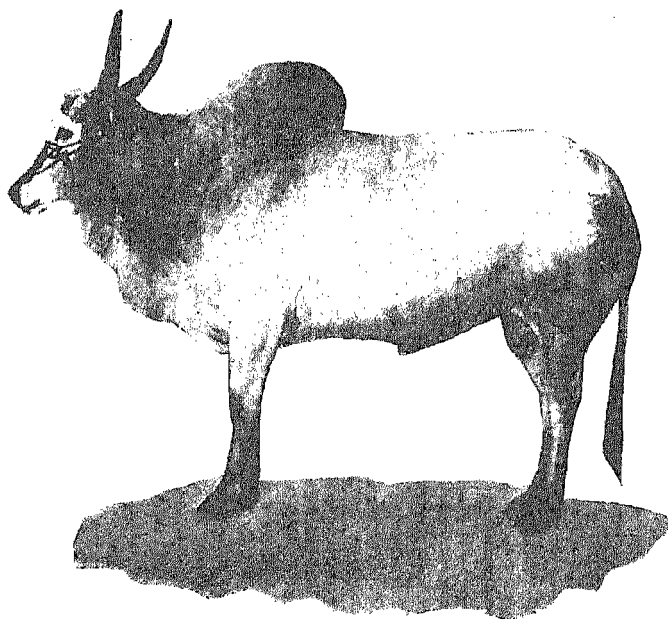
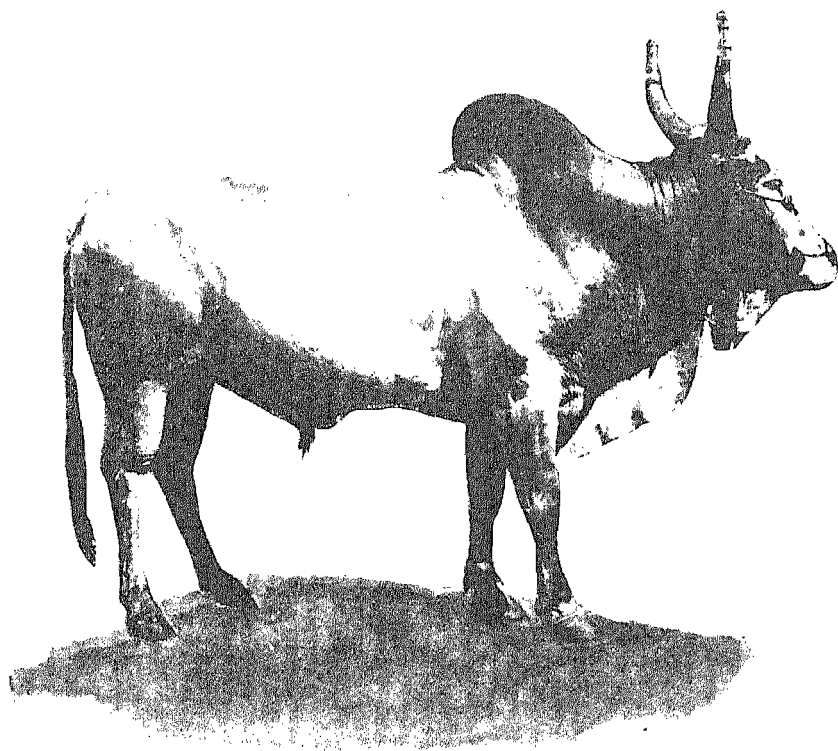
BARGUR HILL BULL (8 YEARS).



BARGER HILL HEIFER (3 YEARS).

PULIKULAM OR JELLICUT BREED.

Other names have been given to this breed and they are sometimes known as Kilakad or Kilakattu. This is a very numerous breed and although a fair number are bred in the various villages in the Madura district, by far the largest breeding operations are conducted in the south and south-west of Madura; large numbers are also raised in the vicinity of the Cumbum valley and the Periyar river where there are grazing grounds of vast extent. In the Cumbum valley many of the owners of the largest herds of cattle are merely landlords leasing out their lands to tenants. They have to depend entirely on the forests for grazing; this is supplemented in the hot weather by grazing in the reserved forests of the Travancore plateau which receives hot weather showers much earlier than in the valley. The cultivating tenants, who own most of the straw rear very much better cattle and often make the rearing of promising bull calves a supplementary source of income; and there is little doubt that this valley could be made a valuable source of supply, if there was a more equal division of property. The cattle of this valley have many points in common, but they are evidently of mixed origin. Formerly before cultivation had extended to its present extent, this and neighbouring valleys were noted as grazing grounds and cattle used to be sent here for grazing, from the east. The Pulikulam cattle, a quick trotting breed, said to have been evolved for the benefit of the Ramnad district zamindars for quick transport into Madura, are said by some to



JELICUT BUTTS

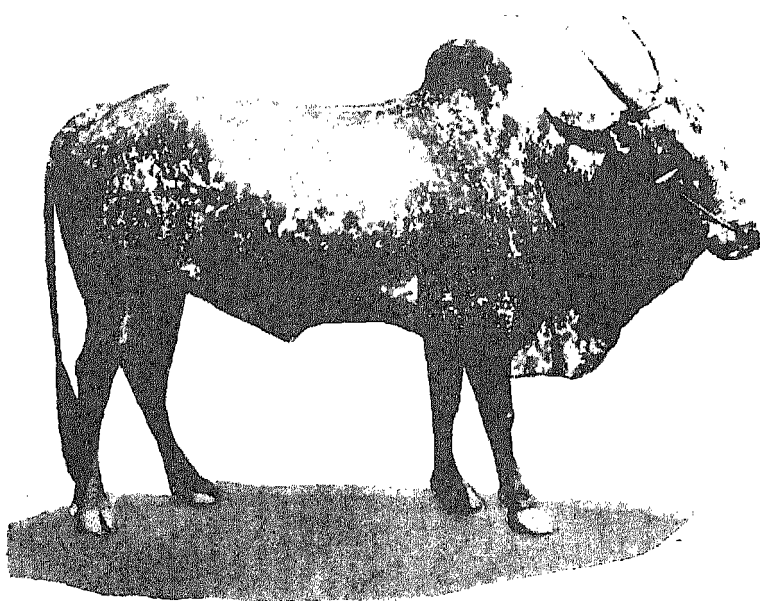
have been absorbed here, when they were no longer required after the opening of the railway.

This is one of the few places in the southern districts where breeding bulls are still specially set apart and maintained, though they are not selected for any special quality, but all male animals born on a certain day of the year are set apart for breeding. The bulls are very compact, with short legs and hard feet. The loins, shoulders and neck are very powerful and they are capable of doing good work. The cattle, on the whole, are comparatively small in size, but are very active and capable of much endurance. In some places bulls are dedicated for breeding purposes. Some of the best types of bulls in many of the villages in South Madura are selected and reared mainly for Jellikut or bull baiting purposes which is very common and this is, probably what has given to the cattle a more or less fixed type. A good fighting bull realizes on the average from Rs. 400 to Rs. 600 and I have seen bulls valued at Rs. 1,000 and Rs. 1,300. The Zamindar of Bodinayakkanur keeps some very good bulls and owns about 500 cows. These fighting bulls are kept for the purpose of bull fighting or rather bull baiting and are known as *Jellicut* which means an ornament of leaves, from the fact that the horns of the bull are usually decorated with a garland and vividly coloured cloth. The method of baiting is as follows: A coloured cloth is firmly tied round the horns of the bull and some gold or silver ornament or rupees attached around the forehead and he is then set free in a narrow gangway usually made of bullock carts and about 200 yards in length. Murasu and tom-toms are played to excite the bull. In the gangway are men who attack it and endeavour to untie the cloth and procure the prize attached; the bull now having become thoroughly excited, resents this and naturally shows fight; it dashes down the gangway with men trying to hold it, some are tossed and others are severely kicked. The men have to catch and hold it and generally the bull has to be thrown down and both hind legs held before the cloth can be untied. It is no uncommon occurrence for men to be injured or even killed, but nevertheless the sport is most popular. I have seen a bull in Cumbum which has already killed 14 men and it was valued at Rs. 1,400. Bulls selected for this purpose are fed and well cared for, they are kept apart and fed by the owner only, so as to make them savage towards strangers. To show how popular is this sport, I may say that hundreds of these fighting bulls are kept for this sole purpose.

In many points they resemble the small sized variety of the Konga or Kangayams, but they are finer bred and give the idea that they have in them a strain of Mysore blood and this is highly probable judging from the colour, etc. Some bulls are grey in colour with fawn markings on the head, shoulders and hump and the



JELLICUT BULL.
(In fighting regalia.)



JELLICUT BULL.

switch of the tail is brown; others are black and white in colour and others grey and dark grey. The larger ones are extensively used for coach work and they are capable of trotting continuously 5 or 6 miles an hour. The cows are of all colours, small in size and poor milkers.

The cattle are grazed in the grazing areas in the Cumbum valley and large herds can be seen in these parts. The cows are generally sent to the hills and forests for grazing from July to January. Cows calve at about 4 years of age in the tract and produce a calf once in two years or so on the average. In a lot of the herds seen in this valley there are quite a number of poor specimens of cows and heifers which could be eliminated to the ryot's advantage.

It is seen that the size of these bulls is deteriorating and during the last 30 years have lost about 2 inches in height. Good draught cattle are required in these parts and further south and it may be advisable to use the Kangayam bull on these cows in order to get back the size and to produce bigger and stronger bullocks.

Description.

Head.—Face of moderate length, muzzle fine, forehead moderately broad, horns wide spread and curved backwards having sharp points, ears short and erect, with quick and prominent eyes.

Neck.—Short and stout.

Hump.—Well developed.

Dewlap.—Narrow, thin and extending to the chest only.

Body.—Compact and well ribbed up.

Back.—Broad, short and slightly higher at the croup.

Quarters.—Strong and level.

Sheath.—Tight and adherent to the body.

Tail.—Long with large tuft of hairs.

Legs.—Strong, short and well set apart.

Colour.—Usually grey with dark grey or fawn markings.

Average bullocks of this breed can be purchased from Rs. 150 to Rs. 200 per pair on the average.

KAPPILIYAN BREED.

A Kanarese colony of the Kappiliyan caste (Kappiliya Gounden) who in the past settled in the Cumbum valley brought with them from the north a small herd of cattle which still exist. They are not very numerous or of a somewhat distinctive breed. In describing them the Manager of Kappiliya Gounders' Association, says that they are small, active, round barrelled animals well known for their trotting powers, which the people themselves declare to

be the descendants of some cattle they brought with them when they first came to these parts. They are called the *Devaru Avu* in Kanarese or in Tamil *Thamburan Madu*, both of which phrases mean "the sacred herd."

The cows are never milked, and are only used for breeding. Members of the herd which die are buried, and are not, as elsewhere allowed to be desecrated by the chuckler's skinning knife.

The leader of the herd is called the "King bull" *Palladu Avu*, and when he dies a successor is selected in a quaint manner, with elaborate and expensive ceremonial. On the auspicious day fixed for the election, the whole herd is assembled, and camphor, plantain, betel and nut, and so forth are solemnly offered to it. A bundle of sugarcane is then placed before the herd, and the attendant Kappiliyans watch eagerly to see which of the bulls of the herd will approach and eat this. The animal which first does so, is acclaimed as the new "king bull" and is formally installed in his office by being daubed with saffron and kumkumam and garlanded with flowers. Thereafter he is treated by the whole caste as a God, is given the holy name of *Nandagopalaswamy*, and is allotted to watch over and worship him, a special attendant, who enjoys the inams which stand in his name, and is the custodian of the jewels and the copper grants which were presented in days gone by to his predecessors. There are now nine of these grants, but they do not state the Sakka year in which they were drawn out, and the name of the rulers are not identifiable.

The attendant enjoys the use of 4 or 5 acres of wet land and about Rs. 600 per annum is subscribed for helping to maintain this herd.

The "King Bulls" are credited with having performed many miracles, many of which stories are still eagerly related, and their opinion is still solicited on matters of importance.

A small quantity of milk is drawn from the chief cow and placed in a small brass vessel (Chombu) and put in a small palanquin (Kavadi) and carried to the hills along with the herd for the hot weather. This Kavadi is then tied in a tree in the forest and left there until the herd returns. When returning, the Kavadi is brought back with the herd.

The King bull's attendant always belongs to a particular subdivision of the caste, and when he dies, his successor is selected in as haphazard a fashion as the King Bull himself. Before the assembled Kappiliyans, Puja is offered to the sacred bull, and then a young boy is seized by divine inspiration and points out the man who is to be the new holder of the office.

The herd receives recruits from outside owing to the Hindus round about dedicating to it all calves which are born on the first

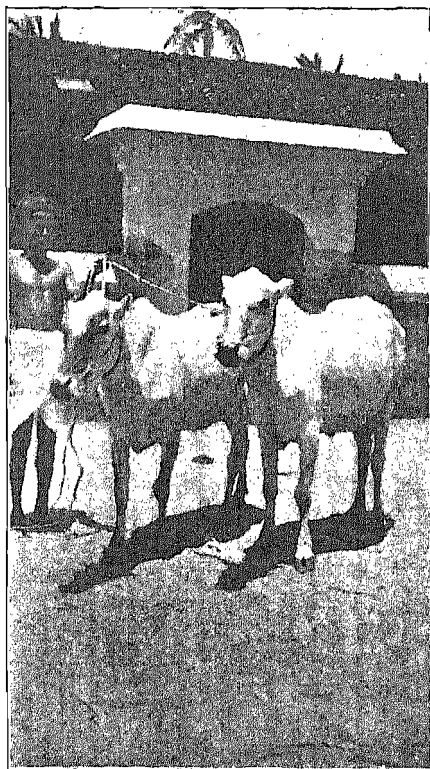
day of the month of Thai, but these are not treated as being quite of the elect. The Kappiliyans raised Rs. 11,000 by taxing all members of their caste in the Periyakulam taluk for three years, and have spent this sum in building roomy masonry quarters at Cumbum for the sacred herd. Their chief grievance is that the same grazing fees are levied on their animals as on mere ordinary cattle which, they urge, is equivalent to treating Gods as equals of men.

No animals are sold from this herd, the deaths are fairly high due to attacks of wild beasts, etc. Cows calve about every 18 months on the average.

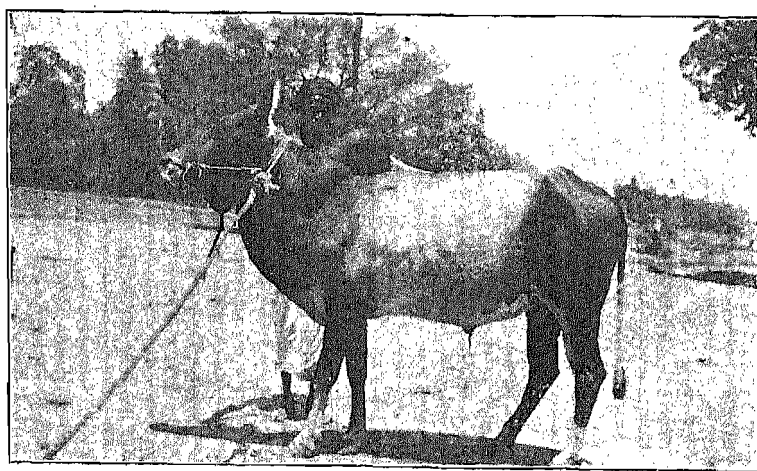
During my visit to these parts the herd was in the interior forests and could not be seen, they are brought down to the plains for Pongal Festival in January. The herd is very similar to the Jellicut breed in size and type due to the inclusion of the yearly recruits of animals of this breed for a very long time.

TANJORE POLLED CATTLE (SOUTHERN BREED).

These animals are bred in certain parts of the Tanjore district and at first sight they would appear to be of a distinct breed, and quite different from any animals found in the Presidency but this is due to the early destruction of their horns and the clipping of their ears, giving the head an appearance of that of the British polled cattle. Tanjore is chiefly a delta area, cows are kept chiefly for manurial purposes, these graze on the paddy stubbles after the crop has been harvested, in fact large landowners allow other cows to graze on their lands for the sake of the manure. Many of them keep good bulls of the Southern breed in order to serve these cows, the man who owns the best bull attracts the most cows in many cases. Many cattle are bought from cattle-dealers who bring them chiefly from Salem and Coimbatore, some are also brought from the breeding grounds in the Cumbum valley in the Madura district. The male offspring which are calved in the Tanjore homestead are, at about the age of six months, dehorned by their owners with the exception of good animals which are retained for breeding purposes, the breeding bulls in most cases retaining their horns. The procedure is to take some hairs from the tail, and these are mixed with jaggery or coarse sugar and the mixture is applied over the young horns; then a heated iron is drawn backwards and forwards until the part is sufficiently burnt. The burnt part takes two or three weeks to heal, and prevents the growth of the horns. A much better and more humane method would be to rub the top of the head where the horns are felt with a stick of caustic potash, rub the skin until it appears slightly raw; this will stop the growth

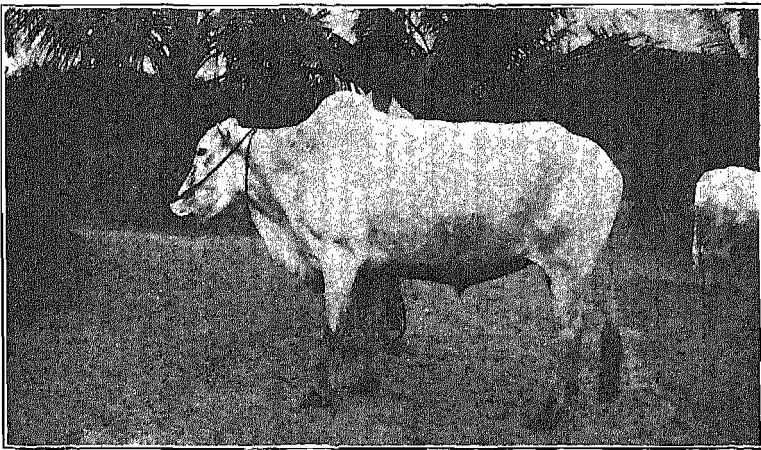
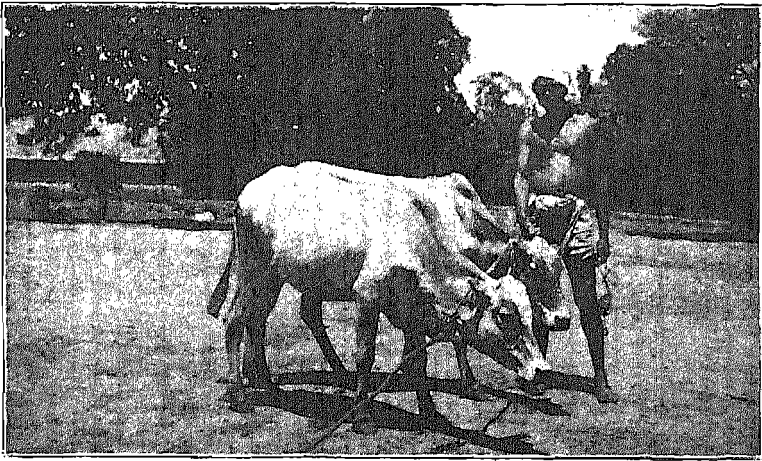


TANJORE BULLOCKS.



TANJORE BREEDING BULL.

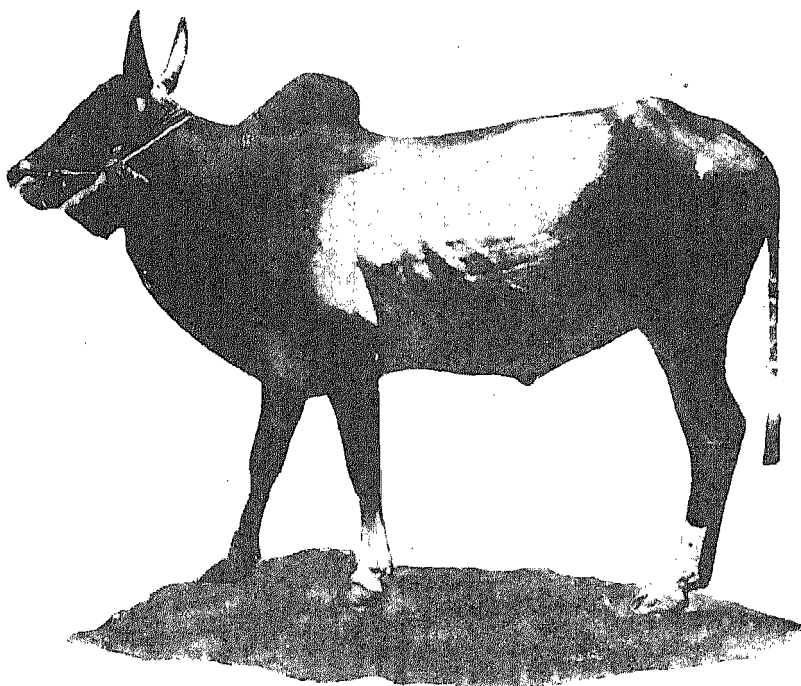
of the horn and will not be so painful. It is advisable to do this when the calves are 1 to 2 months old. It is also customary to cut two or three inches off the ears, as this is supposed to give the animal a bright and alert appearance. The destruction of the horns is supposed to increase its strength and render it more docile, and, to a certain extent, it has this effect. This process alters the appearance of the cattle, and most certainly gives the impression that it is a special breed. It is only in certain parts of the district that cattle breeding is carried on. Except the appearance of the head, these animals present all the chief characteristics of the Kan-gayam breed.



TANJORE BULLOCKS (SMALL).



TANJORE BULLOCKS (LARGE)



TANJORE BREEDING BULL.

The cows are not dehorned, they give about 3 seers of milk per day at their maximum, the calves are allowed most of the milk of their dams and are weaned at about 10 to 12 months old. Bull calves are given green grass from the bunds and paddy straw. They are castrated at about the age of 3 years. The cows, on the average, have 5 to 6 calves during their breeding life. Heifers come to heat at the age of 4 to 5 years. The cows calve generally once in 2 years. It is customary here not to allow the cow to be served whilst she is suckling her calf, the impression being that the cow will lose condition and her milk yield will decrease and the calf will not grow so well. Cows generally are allowed to be covered 10 to 12 months after calving. The calves are red in colour at birth but change to grey and white after they are 6 months old. Some cows in milk are given cotton seed and ragi. The bullocks have fairly quick action and are spirited. A good average bullock will stand about 48 inches high behind the hump and the girth of the chest will be 60 to 67 inches. The majority of the bullocks belonging to the small ryots stand 36 to 41 inches high and the chest girth averages from 50 to 55 inches; they are puny looking animals in many cases.

The price of a pair of good average bullocks at the present time will be about Rs. 150 to Rs. 170 and a good breeding bull with all the fancy points will fetch Rs. 140 to Rs. 170. The price of an average cow is about Rs. 20 to Rs. 40. Breeding bulls generally have fiery tempers, they are dark grey in colour and the fancy points which breeders look for are, a white patch or mark on the middle of the forehead, a white patch on the quarters and tail, white socks or stockings on the legs and a white switch on the tail.

Description of Southern breed bullock.

Head—short, forehead lowered, eyes bright and prominent, horns absent and ears clipped.

Neck—short and thick.

Hump—moderately developed.

Development—thin and extending to sternum only.

Body—compact, ribs well sprung.

Back—fairly level, slightly rising towards the croup.

Quarters—strong and drooping.

Sheath—adherent to the body.

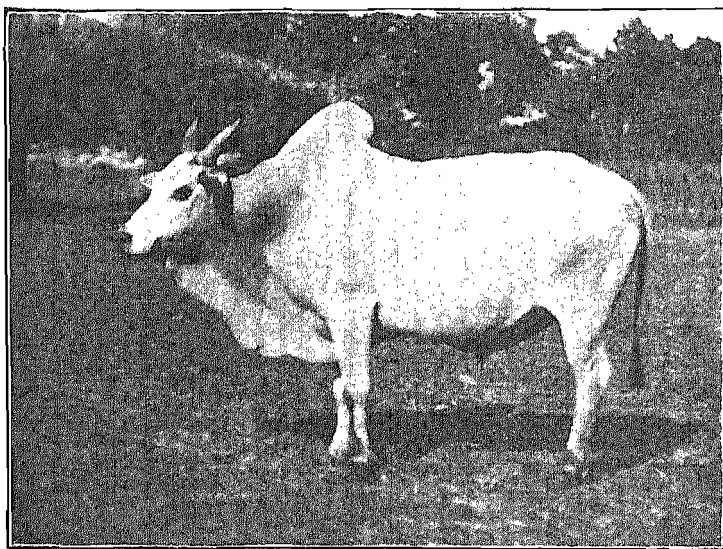
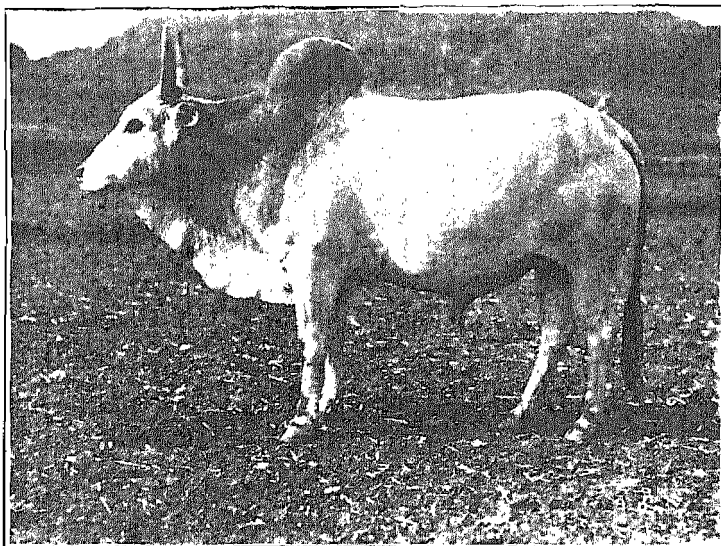
Tail—rather long and tapering with a large tuft, sometimes nearly reaching to the ground; both black and white switches are found.

Legs—short and strong.

Feet—good, being small and hard.

Colour—white or light grey prevails.

Height—from 41 to 48 inches behind the hump.



GOOMSUR BREEDING BULLS.

(Ganjam district.)

GOOMSUR BREED.

This is a small variety of animal found to the north of the Ganjam district. They are very symmetrical in shape and active, and are largely used for cart-work in the district. All over the taluk of Goomsur, there is extensive grazing ground which is very suitable for the rearing of cattle but they never attain any size. Large herds of cattle are seen grazing in this area and breeding bulls are allowed to run with the herd, often a herd of five or six hundred head of cattle are seen grazing together in the Aska district. The cattle do not receive much attention, they exist on grazing and dry fodder, the cows are very poor milkers and calve on the average at the age of 4 to 5 years, they produce calves every 18 months or 2 years. Bullocks are used chiefly for paddy cultivation. In 1908 a cattle show was inaugurated at Berhampur, the chief town of the district and handsome prizes were offered for the best cattle, it was very well attended. The following is a description of a typical Goomsur bullock :—

Head—small, with a flat face, broad forehead, and mild but intelligent eyes. The horns are medium sized curving outwards and inwards.

Body—square, compact, and well ribbed up, with good strong loins; the hump is fairly well developed.

Necklap—thin and reaching to the sternum only.

Skincath—adherent to the body.

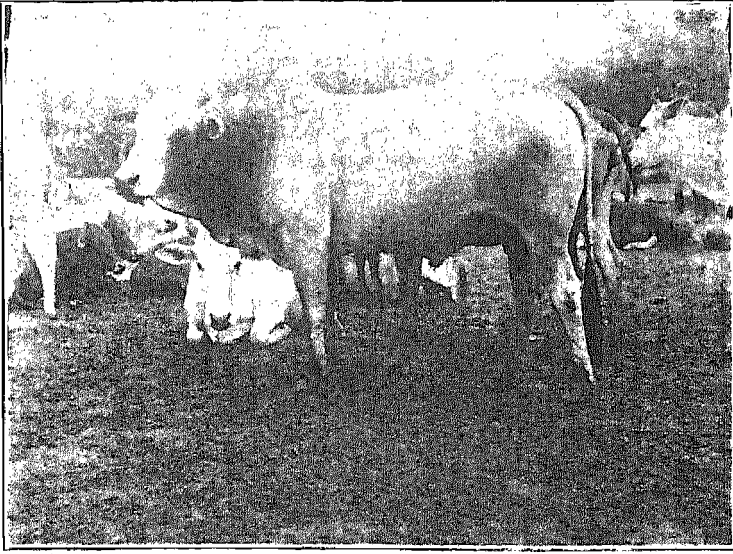
Tail—reaching to the hocks, fine and “whippy” with a large tuft of hair at the end.

Feet—good, hard and sound.

Colour—usually light grey, but other colours also prevail.

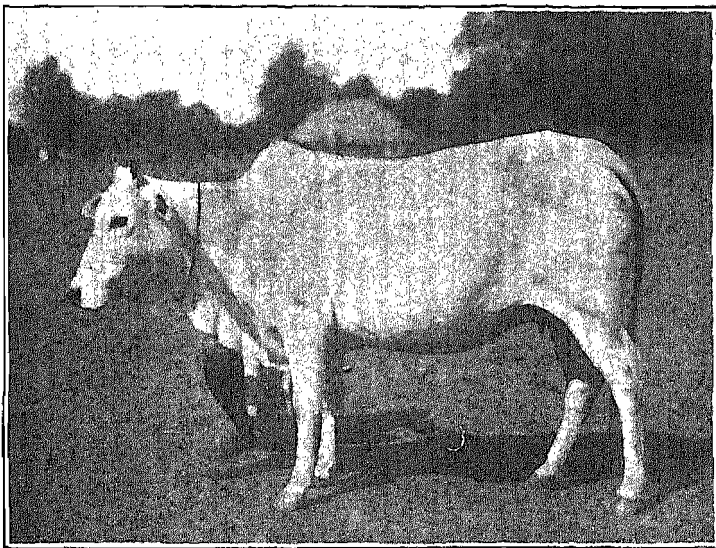
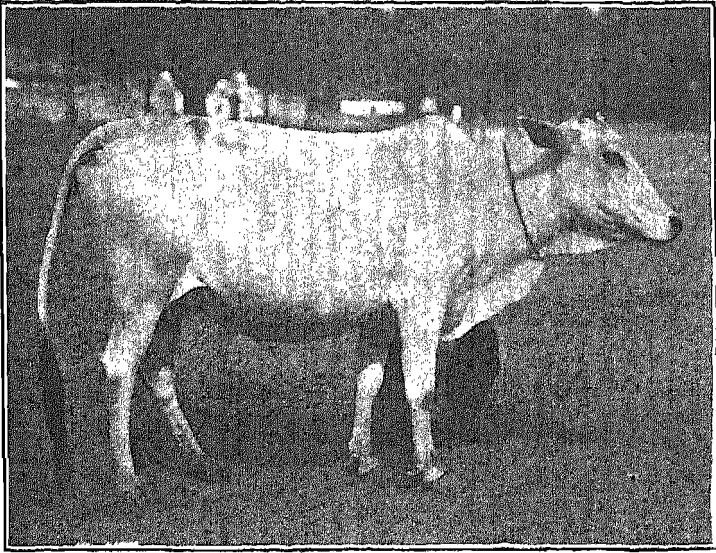
Height—from 42 to 46 inches measured behind the hump.

Some of the bulls have a lump of pendulous flesh on the hump or on the back and bulls possessing this rarity are often in demand as breeding bulls in the tract.



BREEDING BULLS, GANJAM.

Note the pendulous piece of skin from hump.



GOOMSUR COWS.

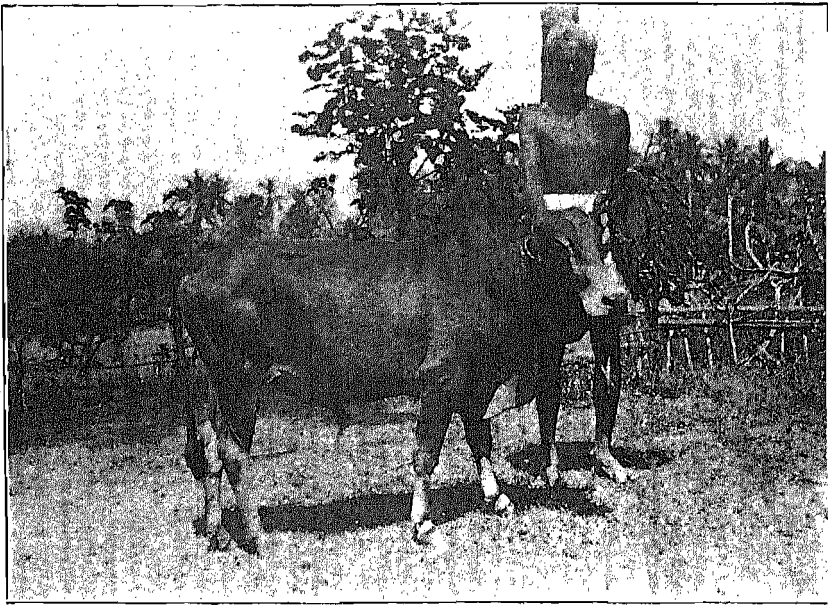
(Ganjam.)

WEST COAST CATTLE.

There is really no distinctive breed of cattle in these parts. Most of the cows and work bullocks are of the small country type and through malnutrition and neglect they have deteriorated.

The bull is generally brown or black in colour and the cows are red, black, grey and broken colours.

Very little attention is bestowed on cattle breeding on this coast; the cattle are very much neglected and are generally allowed to fend for themselves. Heavy rains are received from June to October, the animals are badly housed and are fed on paddy straw and a little grazing. From October to January they get good grazing, but the soil being chiefly laterite is deficient in lime and phosphates; therefore the animals never attain a moderate size.



BREEDING BULL, MALABAR.

In the interior villages neither bulls nor cows are given concentrated food; they have to exist on the grazing most of the year and during the hot weather this is supplemented with paddy straw. After the monsoon there is an abundance of grass on the hills and in the forests, but the people make little attempt to cut and make it into hay or silage for feeding to their stock in the dry season. Some ryots have now taken this up and make a little

silage and another has purchased a bullock driven mowing machine; it is hoped that others will follow. A lot of this lull grass is used for thatching purposes.

Immature bulls are allowed to serve the cows. At the age of 3 years or thereabouts, the bull is castrated and trained for work, then it is given a little concentrated food such as 1 lb. horsegram and a little boiled rice with blackgram or horsegram bhusa as fodder. Average bullocks stand only about 3 feet to 3 feet 2 inches in height behind the hump. A pair of work cattle at $4\frac{1}{2}$ years of age can be purchased for about Rs. 75.

In the towns breeding bulls are fed on concentrated food such as 2 lb. cake, $\frac{3}{4}$ lb. horsegram and a little rice bran, in some cases cotton seed is substituted for the cake.

Cows are small in size and narrow across the back, the udder being small. Each family own 5 to 6 animals, these are grazed daily in herds in charge of boys who are paid at the rate of 4 annas per head per month for about 6 months in the year. During the remaining period they graze in the paddy fields and are given a little paddy straw at night. They are housed in very bad sheds with uneven mud floors, in many cases they are never properly cleaned out and smell strongly. No bedding is provided for the animals although plenty of leaves are available, these would provide suitable bedding for the animal and at the same time make good manure for the ryot.

A cow yields 500 to 700 lb. milk in a lactation with a daily average of about 2 lb. and a maximum daily yield of 5 to 6 lb. A heifer takes the bull between 3 and 4 years and calves down from 4 to $4\frac{1}{2}$ years old. A cow generally calves every 18 months or 2 years.

The cows generally are well maintained in the towns; they are given a little concentrated food and remain in milk for 6 to 9 months, yielding a little more milk.

An average cow will realize about Rs. 35 to Rs. 50 after calving. Calves are given a little kanji in the hot weather. When the heifer calf is weaned, it is generally sent for rearing to the poorer people, who maintain it, the agreement being that the first calf and the milk are retained by the rearer and when the cow calves at the second calving it is returned to the owner. These poor people feed the cows and calves on grass which they shiel daily.

A weaned bull calf at a year old is worth Rs. 8 to Rs. 10 and a heifer calf less.

To improve the cattle on this coast, the Madras Government are placing Scindh bulls at stud in order to increase both the size of the animals and the milk yield. The ryots require advice and

training in the feeding of their stock. Agricultural Demonstrators are giving advice on silage and hay making and this work is gradually being taken up. If animals of fair size and good bone are to be bred in this district, it is essential that they should be given minerals such as lime and bone-meal.

The description of a bull of this breed is—

Head—moderate length—broad.

Horns—short and stumpy.

Neck—short and thick.

Hump—moderately developed.

Devlap—thin and extending to sternum only.

Body—short and compact.

Back—slightly rising towards croup.

Quarters—slightly drooping.

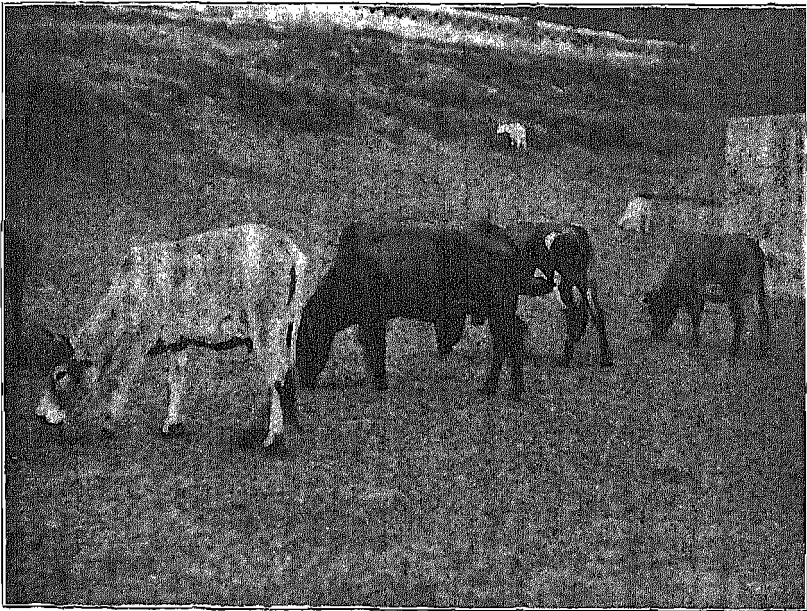
Legs—short.

Feet—small and hard.

Sheath—tight—not pendulous.

Tail—long and tapering with good switch.

Colour—brown and black.



WEST COAST COWS, TELLICHERRY.

THE SCINDH BREED.

This well known breed of cattle comes from the south-western part of Scindh. Mr. Smith, the late Imperial Dairy Expert states :—

It is one of the purest and most distinct of Indian breeds of cattle; it is moreover the only breed of commercially profitable dairy cattle in this country, outside of buffaloes, which can be purchased in large numbers.

It is a dual purpose breed, the females are used for milk production and the bullocks are engaged in the carting traffic in Karachi port.

The cattle are invariably red in colour with, in some cases, white markings on the dewlap, udder and hinder parts of the belly. The bulls are darker in colour than the cows, some being very dark when fully grown. Grey or white animals, although they may approach to the breed type in shape and other characteristics, are not true Scindh cattle. They possess a good shining coat and the skin is soft and mellow.

The characteristics of the breed are—

Head—short, forehead broad and generally slightly protruding, eyes are clear and well set apart; muzzle is broad; ears long and drooping.

Neck—short and fairly thick.

Horns—short and thick.

Hump—well-developed.

Body—short and compact, broad chest and ribs well sprung and deep.

Back—short and slightly higher at the croup.

Quarters—narrow and drooping.

Dewlap—fleshy, hanging in folds and extending to the sheath.

Sheath—Pendulous; cows have also a fold of skin in the position of the sheath.

Tail—long and tapering with fine switch almost reaching the ground.

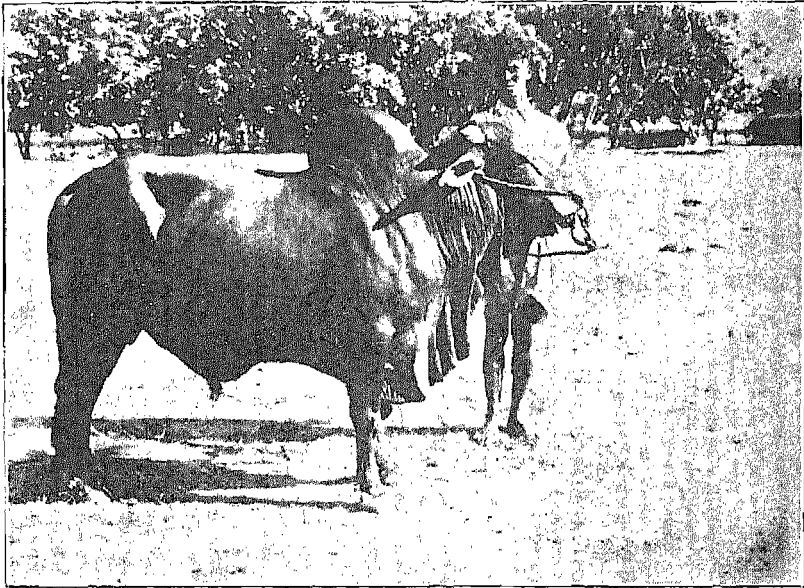
Legs—short and strong.

Feet—small.

Colour—red and dark-red merging to black in some bulls, fine glossy hair.

Temper—very docile.

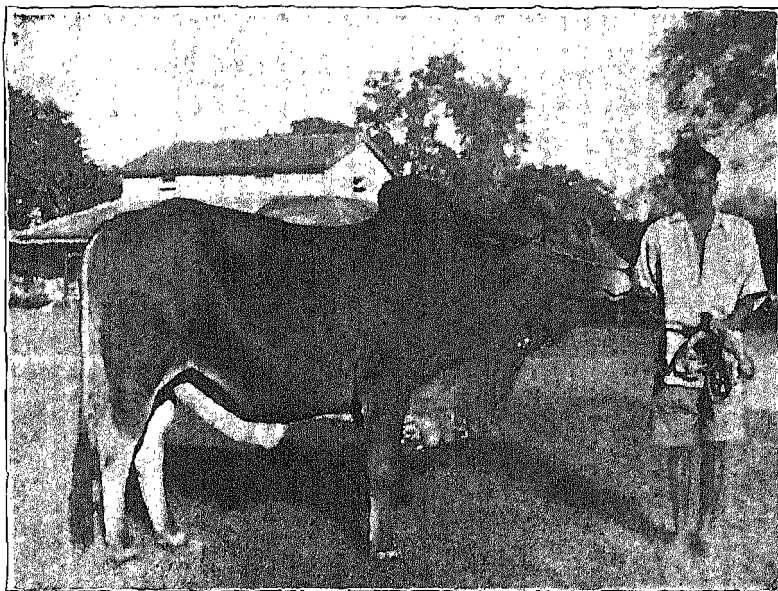
In cows the udder is generally well formed with large well set teats, as the cows advance in age, their udders become pendulous. The herd is more susceptible to udder complaints than the indige-



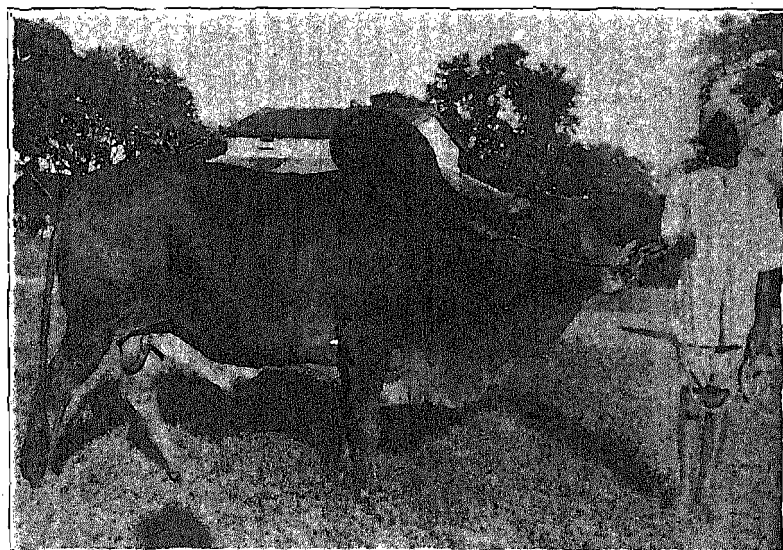
SCINDH BULL NO. 129.



SCINDH BULL NO. 106.



SCINDH BULL NO. 50.
Age $3\frac{1}{2}$ years.
(Dam's best yield 6,339 lb.)

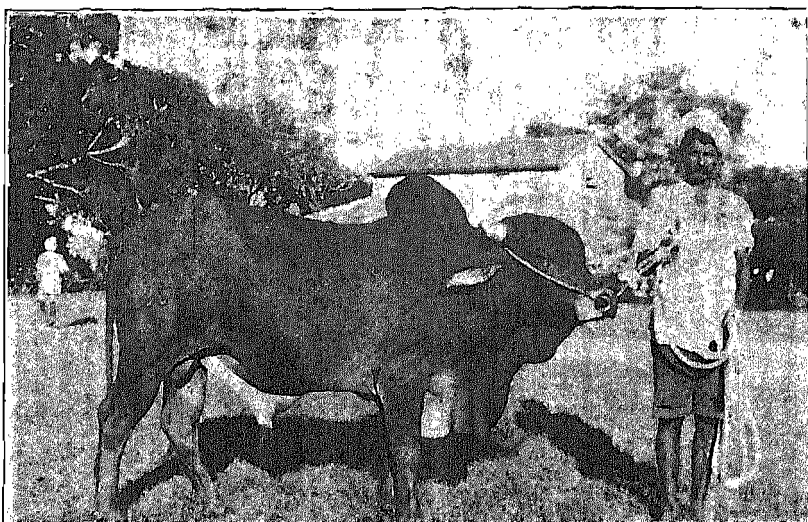


SCINDH BULL NO. 38.
Age $4\frac{1}{2}$ years.
(Dam's best yield 5,979 lb.)

nous cows of this Presidency. The cow is particularly placid and docile and moves with easy grace. The bullock although slow in motion is a steady worker. The bull is sometimes slow at service.

Cattle of this breed have been exported to Ceylon, Malay States, Siam, Burma, Mesopotamia, Mauritius, Borneo, etc.

A herd of 70 Scindh cows are maintained at the Livestock Research Station, Hosur. The cattle thrive well there and even do well on scanty rations. The aim is to build up a herd of good



SCINDH BULL NO. 65.

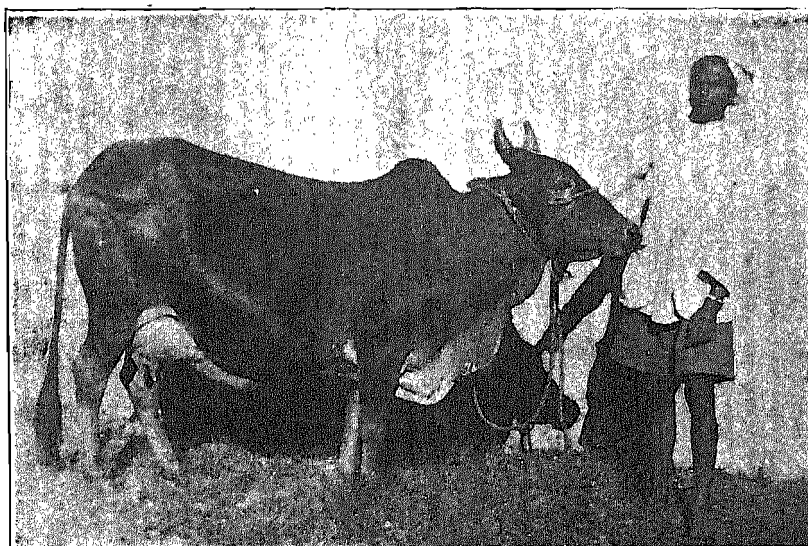
Age 3 years.

(Dam's best yield 6,210 lb.)

milking cows for town milk supply. Bulls are sold for breeding purposes in towns and for the West Coast where the cattle are small and very poor milkers. Bulls are ready for stud work at the age of 2 years 6 months to 2 years 9 months. The demand for this breed of cattle is growing yearly. The Buckingham and Carnatic Mills at Madras maintain a pure herd of these animals for their milk supply. Breeding bulls are supplied to them from the Hosur Livestock Research Station. A number of Scindh cows are found in the seaport towns along the Malabar and South Kanara districts, these animals have been brought down by shippers from Karachi and Bombay. Several bulls have been sold to breeders on the West Coast for breeding purposes. Bulls from this herd have also been sold for breeding purposes to the Government of India, Bengal Government and Ceylon.

The milk yields and other particulars of the Scindh herd maintained by the Madras Government are enumerated below:—

Milk yields, etc.—The purchased foundation stock have averaged 3,572 lb. milk with a daily average of 11.9 lb. The cows purchased as calves with their dams have averaged 3,552 lb. with a daily average of 12.1 lb. The farm-bred cows including first calvers have averaged 4,137 lb. with a daily average of 11.9 lb.



SCINDH COW NO. 228.

Milk yields—6,590 lb. Daily average 17.6 lb.

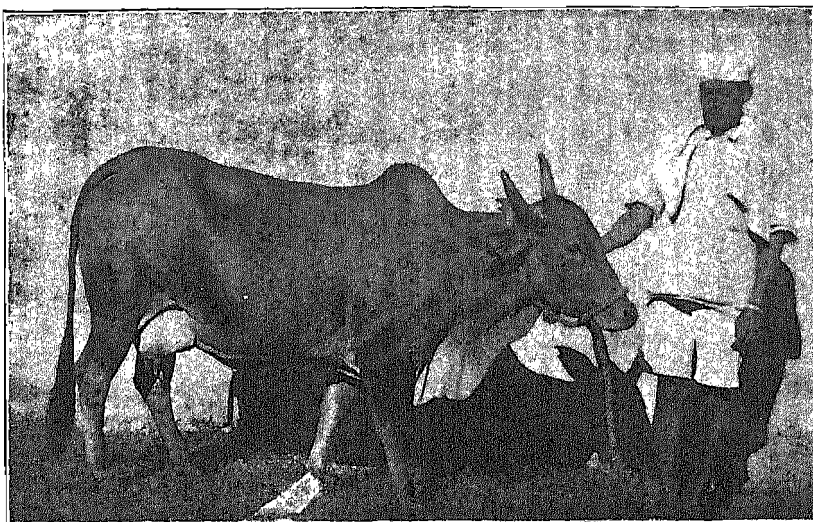
5,523 lb. „ „ 17.5 lb.

5,586 lb. „ „ 18.9 lb.

Eight cows have yielded over 6,000 lb. milk and 11 between 5,000 and 6,000 lb. in a lactation.

The average maximum yields of these three groups are—

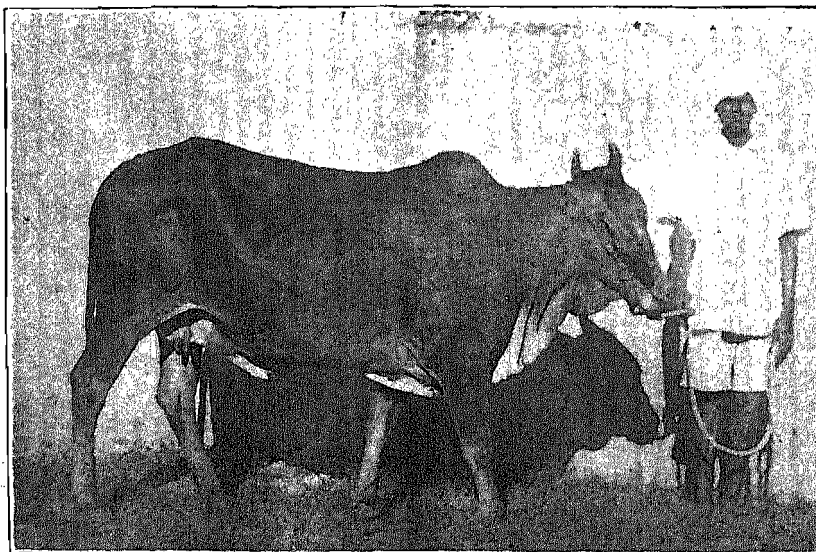
			Yield.	Daily average.
			LB.	LB.
Foundation stock	..	..	4,416	12.6
Purchased with dams	..	..	4,275	13.1
Farm-bred cows	..	..	4,467	12.8



SCINDH COW NO. 15.

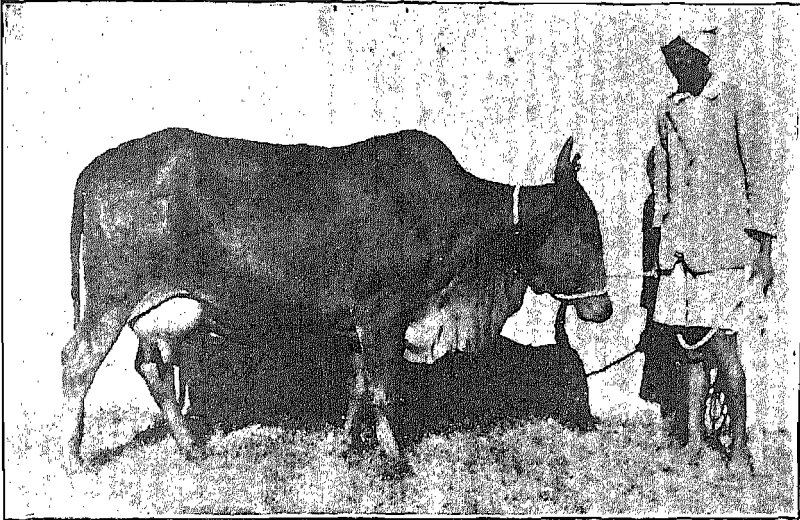
Milk yields—3,782 lb. Daily average 12.3 lb.

6,289 lb. " " 17.3 lb.

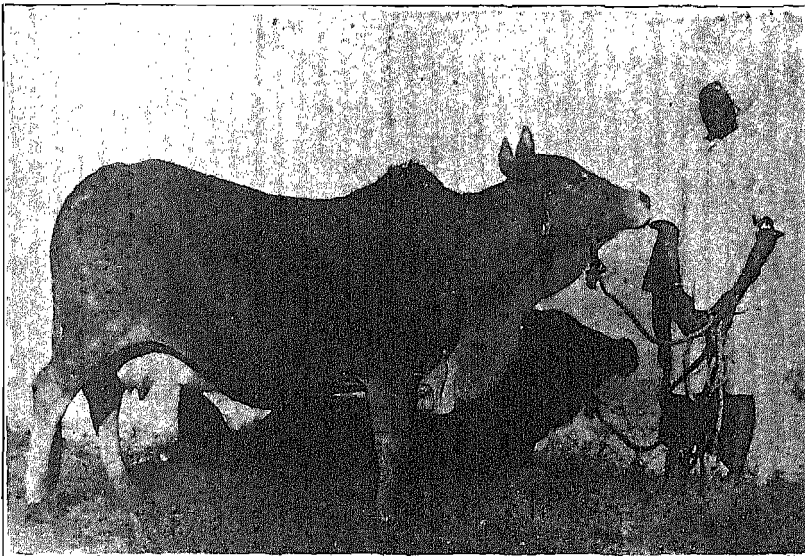


SCINDH COW NO. 43.

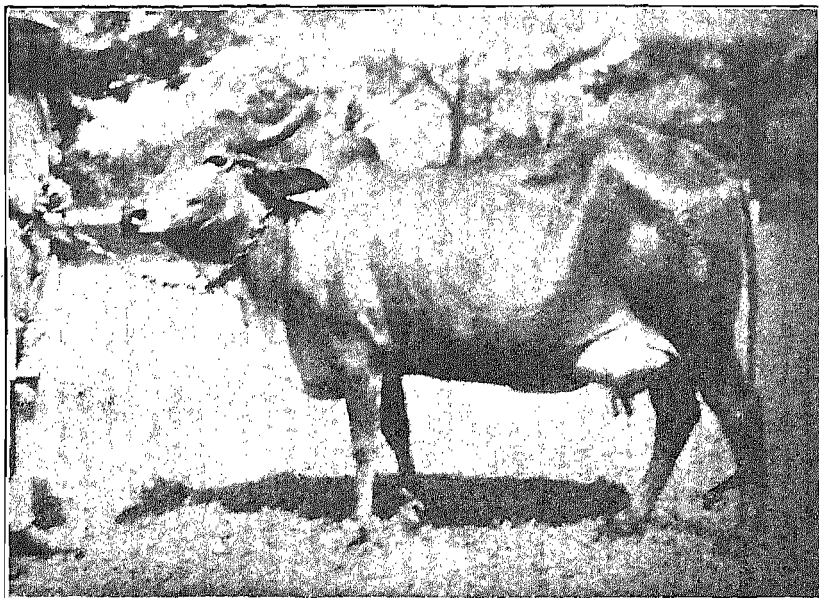
Milk yield—7,717 lb. Daily average 17.7 lb.



SCINDH COW NO. 40.
Milk yield.—5,216 lb. Daily average 13·8 lb.

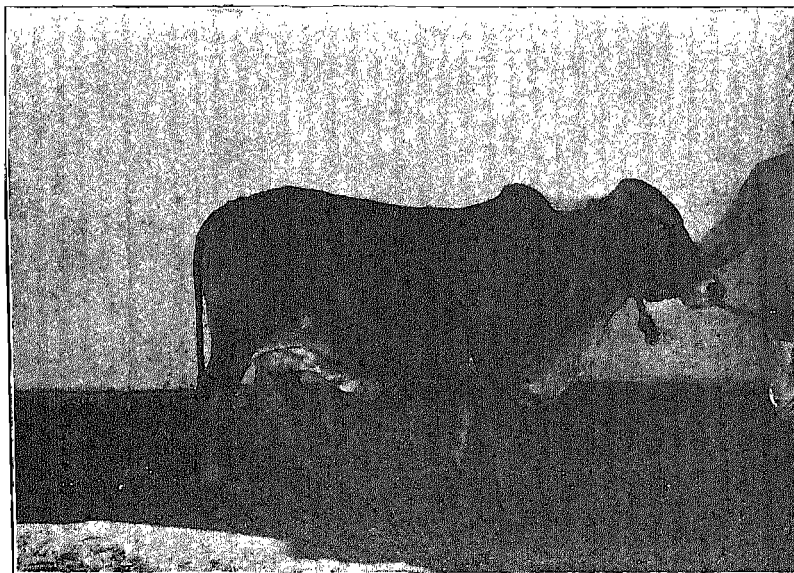


SCINDH COW NO. 232.
Milk yields.—5,160 lb. Daily average 14·1 lb.
6,639 lb. „ „ 15·8 lb.
6,431 lb. „ „ 16·6 lb.
(Has given a maximum daily yield of 34 lb.)



SCINDH COW NO. 25.

Milk yields.—6,139 lb. in 317 days.	Daily average 19.4 lb.
6,767 lb. in 374 days.	„ „ 18.1 lb.
6,861 lb. in 392 days.	„ „ 17.5 lb.



SCINDH COW NO. 38.

Best yield.—5,036 lb. milk.

The foundation cows have all reached their maximum but the farm-bred ones have not. The average number of calvings are—

Foundation stock	..	..	..	..	4.5
Purchased with dams	..	..	..	..	3.5
Farm-bred cows	..	..	..	..	2.3

The number of days dry omitting abnormal cases of 300 days or over are—

	Days.
Foundation stock	190
Purchased with dams	180
Farm-bred cows	158

Taking the whole herd, the cows have averaged 3,251 lb. milk in 309 days with a daily average of 10.5 lb. The average number of days dry is 176 ; this includes first calvers.

Cows have calved on the average every 16 months.

Milk yields of some of the best performers are—

Cow number.	Number of calvings.	Average milk yield.	Average daily average.	Maximum milk yield.	Daily average.
		LB.	LB.	LB.	LB.
25	5	5,640	16.9	6,861	17.5
228	2	4,934	15.1	6,590	17.6
230	3	4,631	15.9	5,081	15.9
232	3	5,899	14.9	6,639	15.8
236	2	5,031	16.6	5,271	12.7
238	3	4,821	12.3	5,203	13.6
244	4	5,077	14.4	6,210	15.8
38	4	4,346	13.2	5,036	14.0
144	6	4,294	12.6	5,023	12.6
160	5	4,027	13.0	5,051	14.1
5	2	5,590	16.3	6,095	17.2
9	1	4,733	11.6	4,733	11.6
12	2	4,669	13.8	4,961	15.1
145	6	4,233	12.0	5,979	14.8
180	6	4,084	13.3	6,041	18.3
218	3	4,927	10.7	5,392	14.1
24	2	4,663	12.6	4,663	12.6
33	1	4,810	12.5	4,810	12.5
40	1	5,216	13.8	5,216	13.8
42	1	5,231	15.7	5,231	15.7
43	1	7,118	17.7	7,118	17.7
49	1	4,929	14.7	4,929	14.7

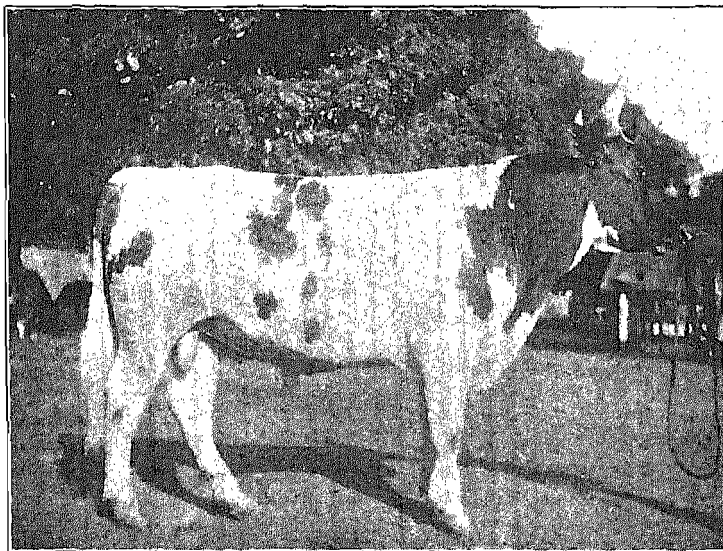
Weights.—The average weights of calves at birth are—

	LB.
Bulls	47
Heifers	42

The average weights of adult bulls and cows are—

	LB.
Bull	950 to 1,000.
Cow	650 to 750.

Heifers take the bull at an average age of 28 months and calve down at the age of 3 years and 1½ months.



IMPORTED AYRSHIRE BULL.

THE CROSS-BRED BREED.

The town dairyman in India requires for his business a good milch cow which will calve regularly and if possible, milk without its calf. He draws for this purpose on the breeding tracts of country districts taking the pick of the cows therefrom. In Madras the Ongole breed is considered to be the best milker for dairy purposes, the average yield being between 2,250 and 2,500 lb. Young cows in milk are purchased and brought into town and in many cases, when these cows go dry, they are sold to the butcher and

thus are lost to the country. The town milkman moreover usually neglects to feed his heifer calves properly, so that the towns are apt to become a serious drain on the country breeding tracts.

The problem is probably poristic, but one possible solution suggested by Carruth was thought to be the evolution of a new breed specially suited to urban needs by using an Ayrshire bull on local Scindh and Saniwal cows. The first generation half-bred bull is used on the first generation half-bred cow, the second generation bull on the second generation cow and so on. Thus the evolved breed always retains half the imported blood and half the indigenous blood.

This experiment was begun in 1919 and until 1923 was conducted at the Military Dairy Farm at Bangalore. Early in 1923 the Madras Government acquired 32 half-bred cows and heifers from the resulting herd and continued the work on their own cattle farm at Hosur. During the course of the work in Madras 222 calves have been born. All except the F. 1. generation were weaned at birth. The calves were classified as follows:—

	Generation.				Heifers.	Bulls.	Total.
F. 1	15	12	27
F. 2	27	33	60
F. 3	43	54	97
F. 4	13	22	35
F. 5	3	..	3
Total	101	121	222

The death-rate was rather heavy. Improper feeding of the calves caused stomach trouble, in some cases followed by pneumonia. The total mortality was 106, the chief causes of death being:

Johnes disease	..	..	..	..	6
Pneumonia	..	..	..	..	21
Rinderpest reaction	..	..	..	..	18 including calves used as controls.
Enteritis, etc.	..	..	..	..	19
Blackquarter	..	..	..	..	5
Pyroplasmosis	..	..	..	..	4

The calves of the second and third generation did not grow as well as those of the first generation. This was partly due to difficulties in hand-feeding, work which, with a limited staff, it is difficult to supervise, and which must be left to a great extent to attendants with insufficient knowledge and training. Feeding of milk at the wrong temperature to young calves is very apt to cause scouring, from which animals are slow to recover. Ring-worm, also proved troublesome, resulting in retarded growth.

Irregular breeders and poor milkers were from time to time eliminated from the herd while adult bulls were used for work purposes and a large number of superfluous bull calves were sold. The total strength of the herd at present is—

Generation.				Cows and heifers.	Breeding bulls and young bulls.	Heifer calves.	Bull calves.	Total.
F-1	..	..	..	6	2	..	..	8
F-2	..	..	..	5	4	1	..	10
F-3	..	..	..	17	3	2	..	22
F-4	..	..	..	4	4	1	3	12
F-5	..	..	..	..	..	1	..	1
Total				32	13	5	3	53

Twenty-eight F-1 cows calved at an average age of 2 years 7 months and 20 days; 27 F-2 cows at 3 years and 16 days; 12 F-3 cows at 3 years 2 months and 1 day; and 2 F-4 cows at 3 years and 1 day.

Milk yields.—The average number of completed lactations per cow in each generation is shown below :—

Generation.						All animals.	Herd excluding poor milkers, etc.
F-1	..	..	..	..	..	3.6	4.0
F-2	..	..	..	..	..	3.5	3.9
F-3	..	..	..	..	..	2.4	2.5

It will be seen that the F-1 and F-2 generations have reached their best, while the F-3 have not yet done so. In order to have some standard of comparison a herd of 15 Scindh cows were maintained alongside the cross-breds. These were specially selected from a large herd for their milking qualities. The following statements of milk yields include (a) all cows born in the experiment and (b) for comparative purposes, exclude poor and abnormal milkers and animals with exceptionally long dry periods :—

Class.				Average yield per lactation. LB.	Average daily average. LB.	Average days dry.	Average maximum yield. LB.
15 Scindh cows	..	..	..	3,431	12.0	186	4,505
27 F-1 cows	..	..	..	5,021	14.8	113	6,268
23 F-2 cows	..	..	..	3,296	12.3	151	4,247
11 F-3 cows	..	..	..	3,626	12.4	148	4,516

Class.				Average yield per lactation. LB.	Average daily average. LB.	Average days dry.	Average maximum yield. LB.	Average number of days in milk.
15 Scindh cows	..	..	..	3,431	12.0	186	4,505	286
23 F-1 cows	..	..	..	5,122	16.1	83	6,231	312
19 F-2 cows	..	..	..	4,068	14.0	97	4,919	290
9 F-3 cows	..	..	..	4,151	13.3	94	4,550	304

In the F-3 group above two cows in their first lactation gave 1,100 lb. of milk and two cows were dry for 272 days and 349 days, respectively. These have been omitted from the records.

The average daily yield from the date of first calving to that of last calving including dry periods for all the herd was—

					LB.
Scindh cows	..	..	..	..	7.2
F-1 cows	..	..	..	..	12.7
F-2 cows	..	..	..	..	10.5
F-3 cows	..	..	..	..	10.4

Cross-bred cows thus gave on the average 3 to 5 lb. more milk per day from the date of first calving to that of last calving. The F-3 cows are not yet at their best, being still young.

F-1 herd.—In the F-1 herd three cows had extraordinarily long lactations and two aborted after being six months in milk. Only three out of a herd of 23 cows have yielded less milk on the average per lactation than the Scindhs with which they were compared. The highest yield in a single lactation was 9,732 lb. with a daily average of 28.9 lb. This cow in seven lactations averaged 6,574 lb. with a daily average of 21.7 lb. Another good animal had an average for eight lactations of 5,885.6 lb. with a daily average of 18.1 lb. She gave 50.5 lb. of milk per day at her maximum. One cow had abnormal lactations and aborted on two occasions after being six months in milk. She gave 12,731 lb. in 950 days with a daily average of 13.4 lb. and 10,820 lb. in 894 days with a daily average of 12.1 lb. After a difficult parturition at her second calving she became sterile. Another cow aborted about seven months after calving and she had also an abnormal lactation giving 17,092 lb. in 810 days with a daily average of 21.1 lb. Apart from these abnormalities 50 per cent of this F-1 herd have given over 6,000 lb. per lactation and on the whole it is much superior to the Scindh herd with which it was compared.

F-2 Herd.—On the whole the average yield per lactation of this group is less than that of the Scindhs, but if four low yielders are eliminated the average yield for the remaining 19 cows is 637 lb. more than that of the Scindhs, a daily average of 14 lb. as against 12 lb. If the daily average yield from the date of first calving to that of last calving is considered, the F-2 cows averaged 10.5 lb. as compared with 7.2 lb. of the Scindhs, an increase of 3.3 lb. per day per cow. Four cows yielded over 6,000 lb. in a lactation and five between 5,000 and 6,000 lb. The best yield in four lactations averaged 6,773 lb. with a daily average of 18.4 lb., the highest lactation producing 8,380 lb. with a daily average of 18.1 lb. Another cow averaged in six lactations 4,920 lb. with a

daily average of 16.7 lb. On the whole nine cows out of 19 have yielded over 5,000 lb. and 14 have exceeded the average of the Scindhs with which they were compared.

F-3 Herd.—These animals have not yet reached their maximum. Taking the whole herd of 11 cows into consideration the average yield is greater than that of the Scindhs by about 200 lb. If the poorest milkers are eliminated the average yield per lactation for nine cows is 4,151 lb. slightly better than the F-2 herd and 720 lb. better than the Scindhs, the total average being 13.3 lb. as compared with 12 lb. Two cows in this herd have yielded over 6,000 lb. in a lactation and six out of the remaining nine have exceeded the average yield of the Scindhs. The best performance was an average of 5,702 lb. for five lactations with a daily average of 15.2 lb. the highest yield being 6,825 lb. with a daily average of 15.3 lb.

F-4 Herd.—This herd is still very young and only two cows are in milk. One gave 4,108 lb. in her first lactation with a daily average of 10.8 lb. After being dry for 82 days she has calved again and is now giving 20 lb. per day. The other cow has yielded 4,034 lb. with a daily average of 11.3 and is still in milk.

Dry periods.—The following table shows the dry periods in the different herds—

Herd.						Number of cows.	Dry period in days.
Scindh	..	..	..	..	..	15	186
F-1	..	..	..	..	..	23	83
F-2	..	..	..	..	..	19	97
F-3	..	..	..	..	..	9	94

There is here a marked difference, the Scindhs being dry on the average for three months more than the cross-breeds.

Weights.—F-1 calves are allowed to suckle their dams and consequently grow more quickly than the F-2 and F-3 calves which are hand-fed. When the latter go on to ordinary rations they appear to fall off for a few months and do not improve until they are a year old.

The average weight of calves at birth are—

Generation.						Bull calves.	Heifer calves.
						LB.	LB.
F-1	..	..	..	..	..	52	51
F-2	..	..	..	..	..	59	49
F-3	..	..	..	..	..	54	46
F-4	..	..	..	..	..	49	48
F-5 (2)	..	..	..	..	..	..	48½

For cows over four years of age the average weights and heights are—

Generation.				Weight lb.	Height at withers (inches).	Girth (inches).
F-1	..	..	..	859	47½	67½
F-2	..	..	..	750	46½	65
F-3	..	..	..	791	45	63½
F-4 (2 cows)	..	..	..	755	43½	61

Both height and girth decrease with succeeding generations and the animals appear to be reverting towards the size of the Scindhi dauns.

In many cases the coats of F-2 and F-3 cows are rough and they have tight skins,—disadvantages in a hot climate—but these defects disappear as the animals grow older. At Hosur, ringworm has been very troublesome of late years and animals attacked by this disease become severely run down and take a long time to recover. The half-bred calves are not pampered. They are fed on the same lines as country calves and young stock and if they cannot survive, are allowed to go under.

Adult cows on the whole look well, they are not too big and are about the right size for the small dairyman. The bulls are disappointing, the chief fault in the F-2 and F-3 animals being a weakness in the hind-legs. When viewed from behind their hocks almost touch one another. The forepart is generally good with a strong neck and good chest capacity although in some cases they appear to fall away behind the shoulder. Almost all cross-bred bulls are very quick and good at service.

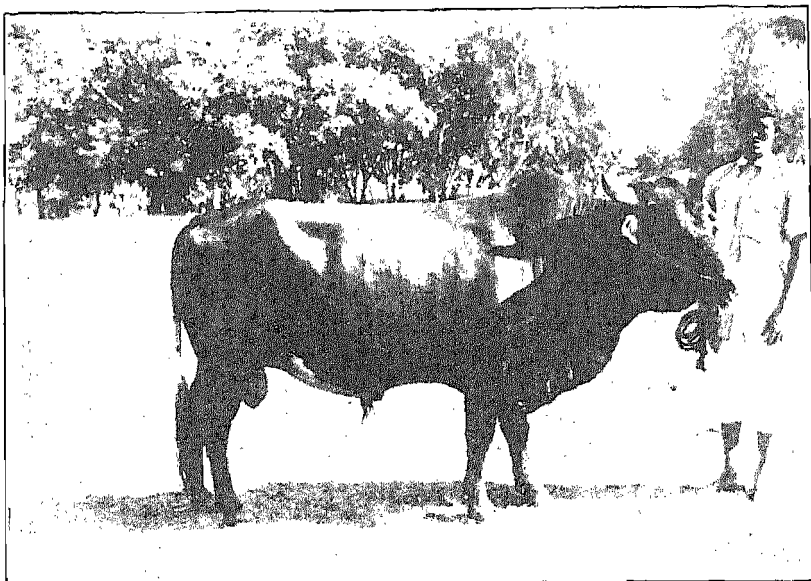
Colour.—The colours of each generation are generally as follows :—

F-1 are black, dark-brown, black and white, and occasionally brown and white and brindle.

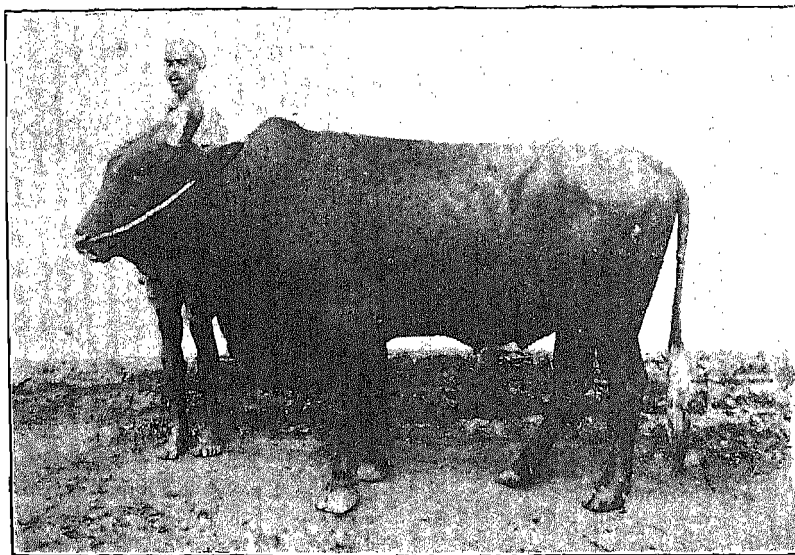
F-2 are mostly reds, light brown and red and white.

F-3 and F-4 are light red, red and white with occasional fawns and black and white. Most of them have smooth coats when adults.

Disease resistance.—Experience during the past twelve years has shown that half-bred cattle stand up to foot-and-mouth disease quite as well as country cattle. As regards rinderpest there is not much to fear provided that the animals are regularly inoculated as calves and re-inoculated at three years old by the " Serum Simultaneous " method. Some of the cross-bred calves have died from rinderpest reaction, while others used as controls have survived. As calves the cross-breds appear to suffer from stomach troubles.



HALF-BRED AYR-ONGOLE BULL.

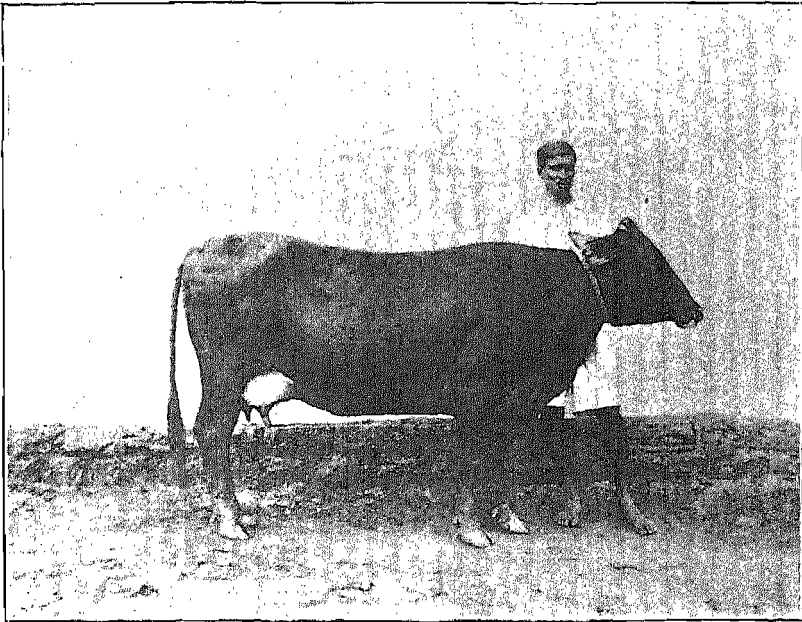


HALF-BRED AYR-SCINDH BULL T-1.

This is probably due to faults in hand-feeding. In Western countries a stockman or labourer takes a pride and interest in his animals but this class of labour is not yet available in India, though it is hoped that with better training and more supervision a higher standard may be reached in the near future.

The cross-bred is not so liable to develop udder trouble as the pure Scindhs.

One defect among the half-bred cows is that many of them do not conceive at the first or second covering, although their dry periods are much shorter than those of the indigenous cows.



HALF-BRED COW NO. 8 (F-I GEN.).

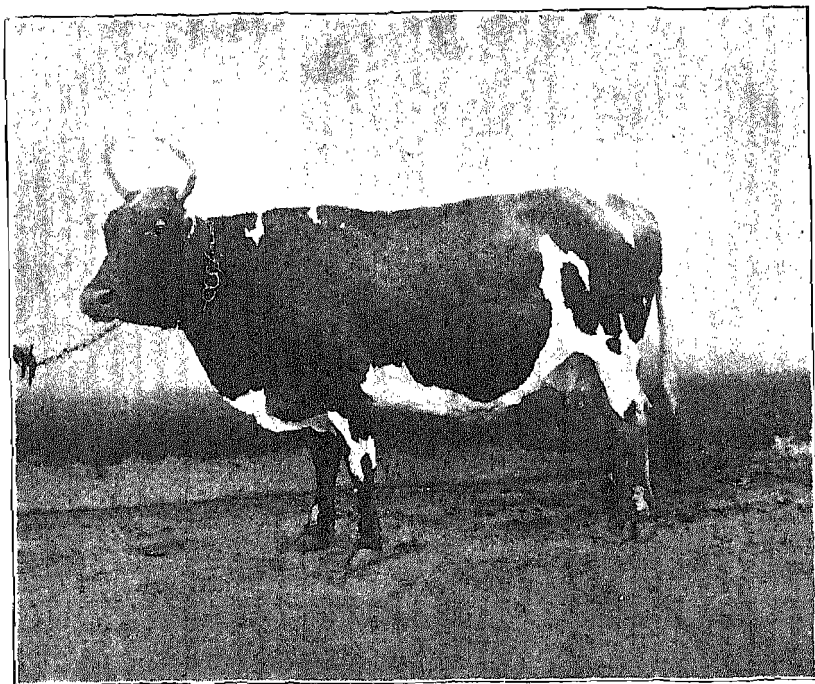
Highest yield.—9,732 lb. milk in 337 days with a daily average of 28.9 lb. Fat 4.2 per cent.

Breeding back to the indigenous animal with indigenous sires.—During the last six years an experiment has been conducted at Hosur with the object of producing quarter-bred Ayrshire, Scindh and Saniwal. A Scindh bull was used on cross-bred cows. Two of these quarter-bred cows have yielded over 5,000 lb. per lactation.

In 1930 the Madras Government purchased 16 quarter-bred Ayrshire Saniwal cows and heifers from the Pusa herd. One of

these has given 8,570 lb. with a daily average 19.9 lb. and in her present lactation has given 13,537 lb. with a daily average 25.2 lb. This is a better yield than has been obtained from any of the half-breeds.

Conclusions.—The essence of success in any cross-breeding experiment is to work on a large scale. At least 200 F-2 cows are needed if a good herd is to be selected. Probably not more than 25 or 30 per cent. would be retained and the same applies to future generations.



HALF-BRED COW NO. 1 (F-1 GEN.).

Highest yield.—7,397 lb. milk in 305 days with a daily average of 24.1 lb.
Fat 4.9 per cent.

The experiment outlined above has been handicapped throughout by being on too small a scale. This rendered drastic discarding impossible and only the very poorest of the milkers and breeders could be eliminated; but even so three cows out of nine in the F-3 generation gave over 6,000 lb. of milk in a lactation, and another would have done so had it not unfortunately died.

The bulls under the conditions of the experiment are admittedly disappointing. Few could be used for breeding purposes. The

cross-bred bull has hardly any hump and in most cases no hump at all. For this reason the ryots do not like them as working-cattle, though on some of the Government Farms they have been worked quite satisfactorily. They would probably, however, suffer from the heat in the plains.

The cross-bred cows and heifers cannot stand up to the semi-starvation ration so often served out to them in India and keep fit like the indigenous breeds. They are all right so long as they are fed and housed well, and naturally a good milker pays for this. Cross-breds seen in the districts in the hands of land-owners have not the same bloom or appearance as those on the Government Farms.

The cross-bred herd has maintained the milk supply at the Agricultural College Dairy, Coimbatore, for the last nine years, and the cows have more than paid for their keep.

The number of cross-bred cows in Madras City has increased considerably during the last ten years and dairymen will rarely part with a cow or heifer possessing the least sign of imported blood in it. Moreover, though the feeding of indigenous calves is neglected, it is rare to see a cross-bred heifer calf in poor condition. These facts speak for themselves, and the opinion held by the dairymen who has to make his living out of the industry carries considerable weight which is in favour of the cross-bred cow.

The experiment has now been abandoned owing to the necessity for economy. The result appears to show that it is possible to evolve a half-bred race of milk cows for Indian Urban districts but it will be expensive as large herds must be maintained for selection. Probably a better solution of the problem would be to breed back on cross-breds of the indigenous breed by the use of good indigenous sires from selected milkers. Calves possessing one quarter or one-eighth imported blood resemble the indigenous animals. They have humps and their size, conformation and coats are better while the heifers appear to be more thrifty feeders than the half-breds.

First Generation F. 1.

Serial number.	Number of cow.	Age.	Calvings.	milk Average yield.	Highest milk yield and daily average.	Average daily average.	Average number of days dry.	Remarks.
		YRS.		LB.	LB.	LB.		
1	1	13½	9	5,885	7,397/24.1	18.1	61	Long dry period of 685 days omitted.
2	2	13	8	6,494	10,529/18.7	17.5	60	
3	3	7	5	3,140	3,735/11.9	10.5	72	
4	4	7	4	3,757	4,267/16.6	15.2	88	

First Generation F. 1--cont.

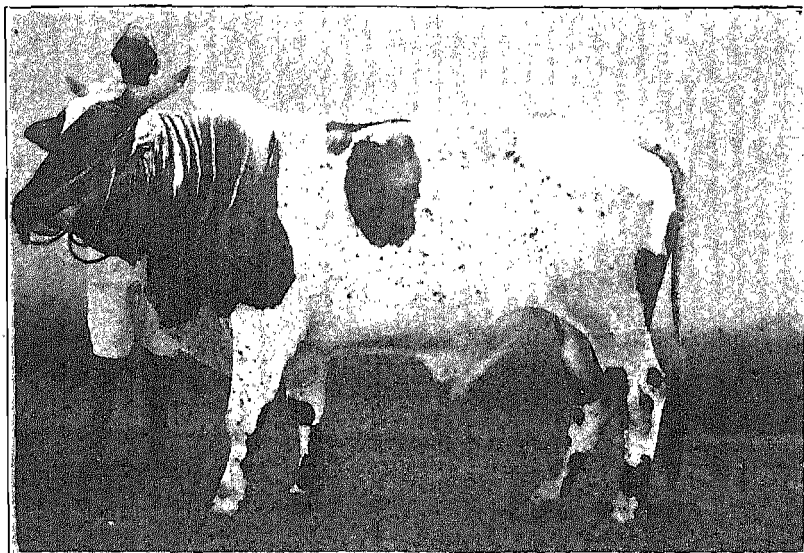
Serial number.	Number of cow.	Age.	Calvings.	milk Average yield.	milk Highest yield and daily average.	Average daily average.	Average number of days dry.	Remarks.
		YRS.		LB.	LB.	LB.		
5	7	8	7	4,633	5,189/14.5	17.2	66	Two lactations of 800 lb. omitted. Cow sick.
6	8	10	8	6,574	9,731/28.9	21.7	87	One lactation of 1,150 lb. omitted.
7	9	5	3	4,314	5,752/18.8	14.8	73	
8	10	6½	2	7,375	9,347/13.5	15.4	290	
9	11	3½	1	6,286	6,286/15.5	15.5	..	
10	12	6½	3	2,483	2,974/10.6	10.1	108	
11	21	9	7	3,200	4,948/17.4	12.3	90	
12	61	12	6	4,526	7,594/15.4	13.7	81	Long dry period of 273 days omitted.
13	113*	7½	3	6,157	7,590/15.7	16.4	48	One lactation of 17,092 lb. omitted.
14	120	9½	6	5,506	7,886/23.5	17.8	84	
15	200	6	3	3,524	4,048/12.1	10.8	76	Dry period of 580 days omitted.
16	210	4	2	4,462	4,873/14.6	15.4	33	
17	213	6	2	6,423	6,717/15.6	17.0	45	
18	221	6	4	5,183	6,439/22.7	18.5	98	
19	263	5	2	5,327	5,469/15.7	18.5	62	
20	271	4½	2	7,326	7,326/20.4	20.4	57	
21	278	4	1	4,299	4,299/13.9	13.9	..	
22	287	3½	1	6,977	6,977/19.5	19.5	..	
23	291	3½	1	3,947	3,947/19.9	19.9	..	
Average ..				4	5,122	6,231/17.3	16.1	83

* Cow No. 113.—Aborted after 7 months in milk; she gave in this lactation 17,092 lb. milk with a daily average of 21.1 lb.

Cow No. 14.—Has been omitted altogether from the above list as she aborted during both lactations; her yields were—

12,731 lb. daily average 13.4.

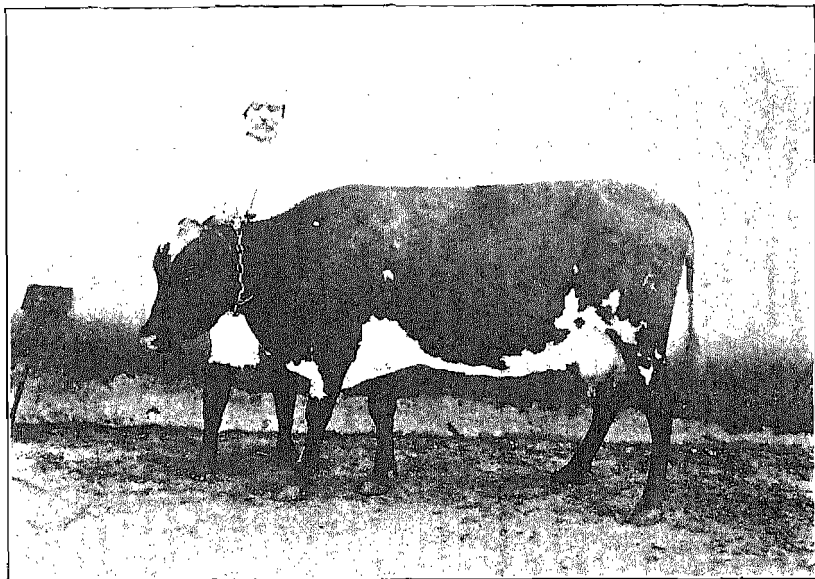
10,820 lb. do. 12.1.



HALF-BRED BULL (F-2 GEN.).

Second Generation F-2.

Serial number.	Number of cows.	Age, years.	Calvings.	milk Average yield.	highest milk yield and daily average.	daily Average average.	Average number of days dry.	Remarks.
				lb.	lb.	lb.		
1	15	11	8	5,084	6,797/21.4	18.9	82	Two lactations of 894 and 1,803 lb. omitted.
2	16	9½	6	4,211	6,093/19.4	14.1	94	
3	17	9	5	6,773	8,380/18.1	18.4	75	
4	19	7	2	3,702	3,702/12.1	12.1	185	Lactation of 901 lb. omitted.
5	22	6	3	2,685	3,587/11.1	11.7	139	
6	32	10	5	4,974	5,712/16.3	15.6	57	One dry period of 274 days omitted.
7	34	10	7	4,920	6,957/17.8	16.7	93	
8	36	10	6	3,880	5,421/16.6	13.9	88	
9	37	8	6	2,537	3,489/12.9	10.9	133	
10	39	9	6	4,118	4,443/12.4	16.1	136	One lactation of 402 lb. omitted.
11	33	7½	4	4,456	5,088/15.8	14.9	131	
12	102	9½	6	3,474	4,728/15.5	12.2	77	
13	122	9	5	4,102	4,684/14.7	14.3	63	One dry period of 655 days omitted.
14	130	7½	6	3,032	3,757/17.5	14.5	106	
15	164	5	2	2,544	2,600/11.4	12.5	105	
16	198	7	3	3,198	3,198/12.7	12.7	80	One lactation of 760 lb. omitted.
17	201	3½	2	5,314	5,314/15.6	15.6	47	
18	227	6	3	3,754	5,173/16.9	11.9	59	
19	266	5	1	4,592	4,592/10.0	10.0	..	
Average ..			4.5	4,068	4,919/15.2	14.0	97	



HALF-BRED COW NO. 15 (F-2 GEN.).

Highest yield.—6,997 lb. milk in 317 days with a daily average of 21.4 lb. and 4.6 per cent fat.



AYRSHIRE-SCIND BULL F 3.

Third Generation F-3.

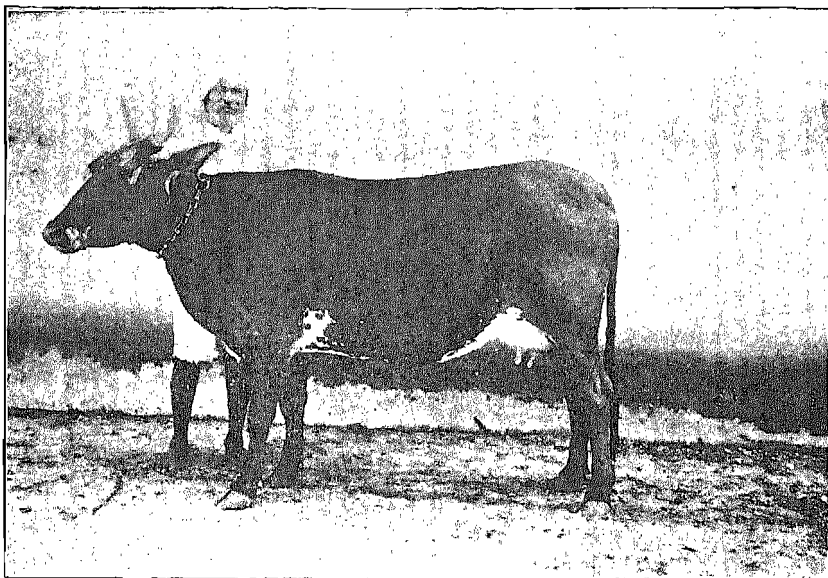
Serial number.	Number of cow.	Age.	Calvings.	milk Average yield.	milk Highest yield and average.	daily Average average.	Average number of days dry.	Remarks.
		YRS.		LB.	LB.	LB.		
1	101	9½	5	5,702	6,325/15.3	15.2	70	
2	139	8½	5	3,102 *	3,028/14.2	12.7	118 *	First lactation 1,229 lb omitted.
3	143	5	2	4,514	4,514/11.5	11.5	52	
4	200	7	4	3,021	4,640/13.2	14.2	89 †	† Abnormal dry period of 340 days omitted.
5	222	6½	3	2,961	3,509/17.5	13.1	115 ‡	‡ Abnormal dry period of 374 days omitted.
6	248	5	2	4,100	4,365/13.2	14.6	109	
7	251	5	2	3,680 §	3,680/9.7	9.7	272 ||	§ First lactation of 1,101 lb. omitted.
8	253	5	3	6,168¶	6,252/19.7	15.1	60	¶ Omitted.
9	258	5	3	3,140	3,534/15.7	13.7	136	
Average ..				3.2	4,151	4,551/14.4	13.3	94

Particulars of some Quarter-bred cows (Half-bred Ayrshire and Three-quarter-bred Scind) bred at Hosur Cattle Farm.

Cow.	Age.	Milk yields.	Daily averages.	Days dry.	Remarks.
NO.	YRS.	LB.	LB.		
225	6	4,455	12.8	95	
		5,534	14.6	18	
		4,297	14.8	71	
		4,510	18.0	..	Still in milk.
247	5	2,477	11.3	241	
		3,063	13.8	102	
		4,359	13.3	..	Still in milk.
250	5	2,540	14.6	202	
		3,588	11.1	..	
261	5½	5,219	16.1	82	
		5,741	18.1	78	
		3,813	24.7	..	Still in milk.
262	5½	3,577	13.4	79	
		2,150	17.0	..	Still in milk.

Particulars of best animals purchased from Pusa in 1930
(¼ Ayr. ¾ Saniwal.)

216 CL	6	8,570	19.9	103	
237 RJ	5½	13,537	25.2	..	Still in milk.
		3,902	13.7	102	
250 MT	5	2,824	12.9	..	Still in milk.
		3,588	11.1	117	
252 MB	5	5,495	15.1	..	
		4,778	15.1	47	
		5,094	19.0	83	
255 RJ	5	4,525	18.7	..	Still in milk.
		4,075	13.1	101	
		9,062	15.1	..	Still in milk.
265 MT	5	700	4.8	284	
		4,370	15.2	90	
		3,674	23.5	..	Still in milk.

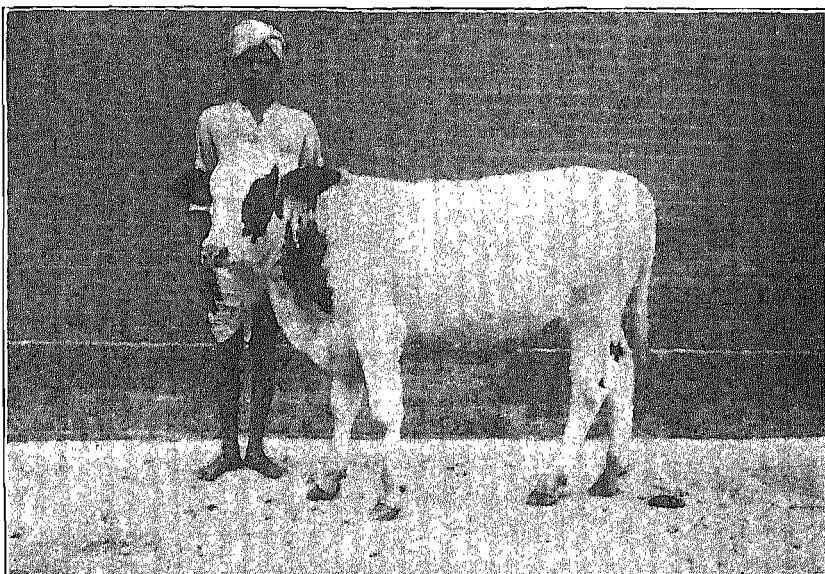


HALF-BRED COW NO. 101 (F-3 GEN.).

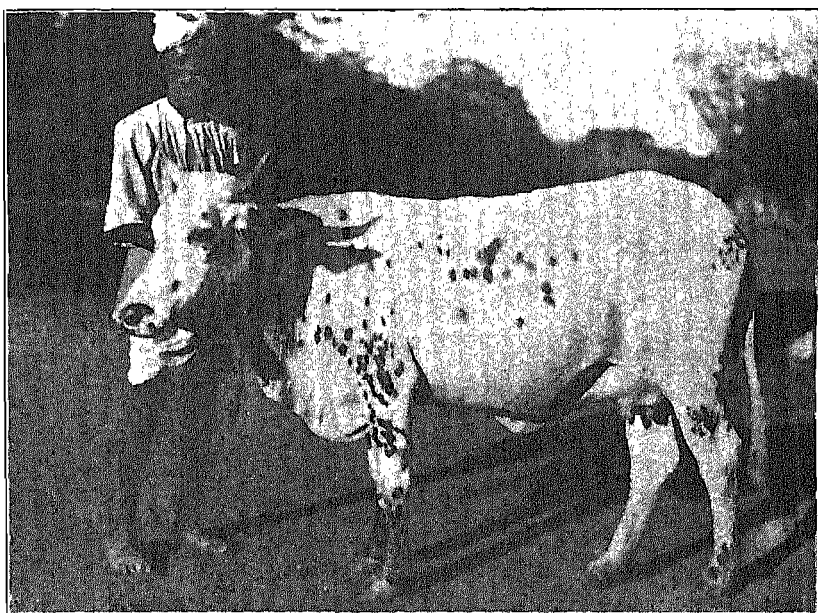
Highest yield.—6,825 lb. milk in 445 days with a daily average of 15.3 lb. Fat 4.6 per cent.



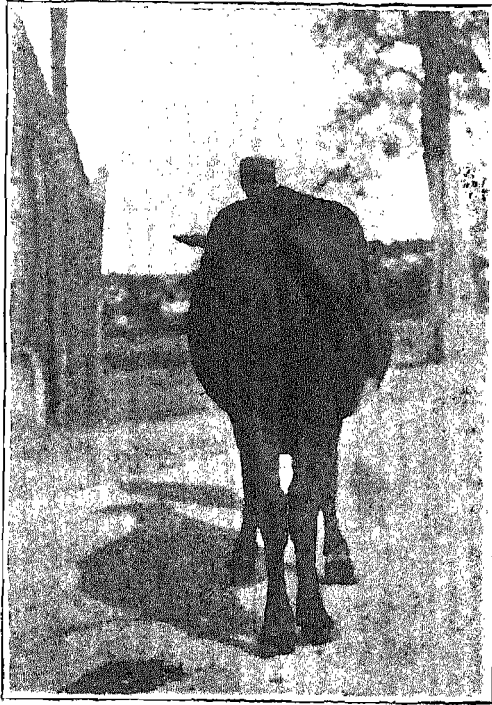
AYRSHIRE-SCINDH BULL F-4.
(2 years old.)



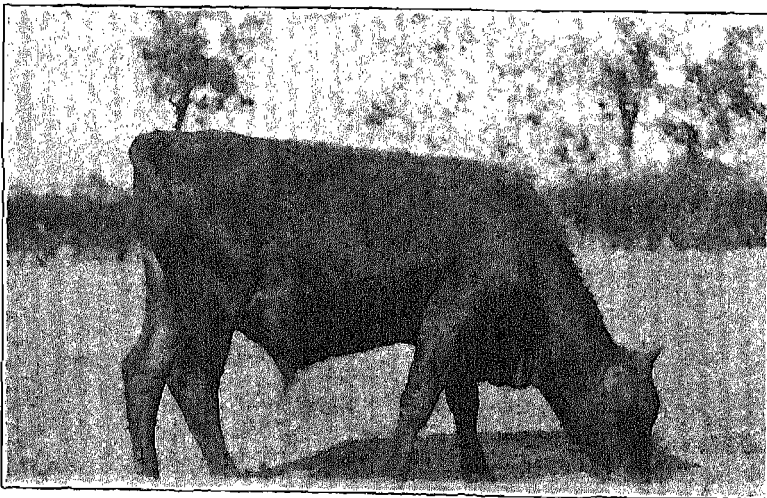
HALF-BRED-BULL CALF F-4.
(Aged 10 months.)



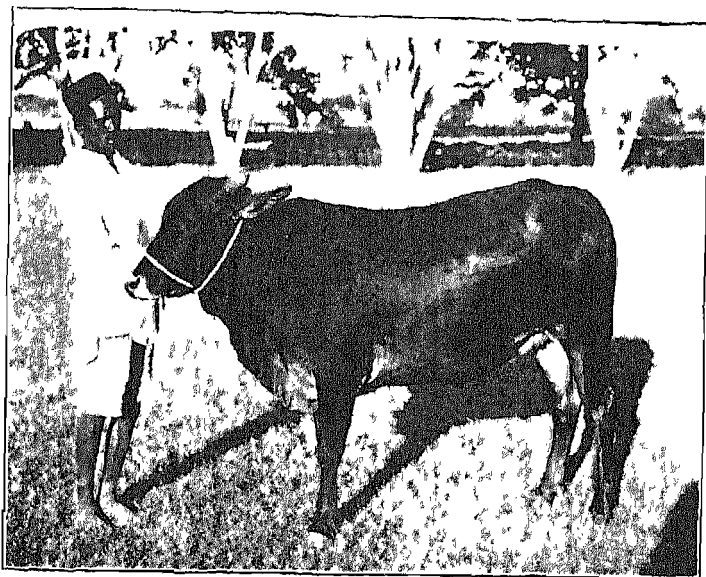
AYRSHIRE-SCINDH COW F-4.



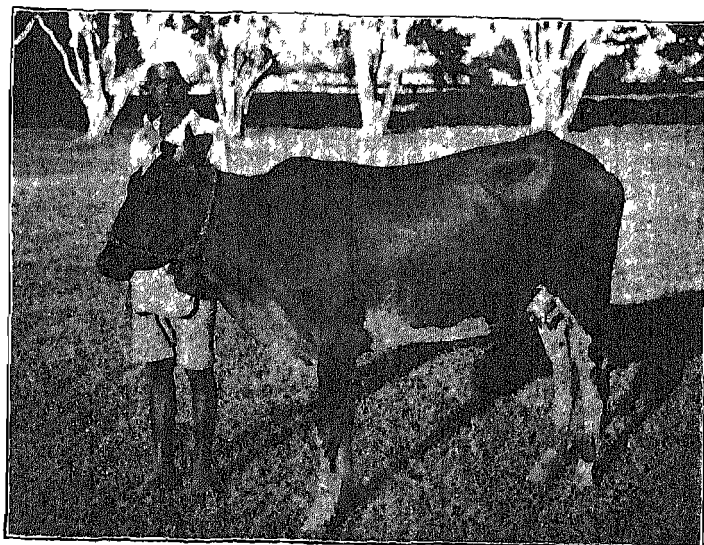
A COMMON FAULT IN F-2 AND F-3.
Half-bred bulls. Weak hocks.



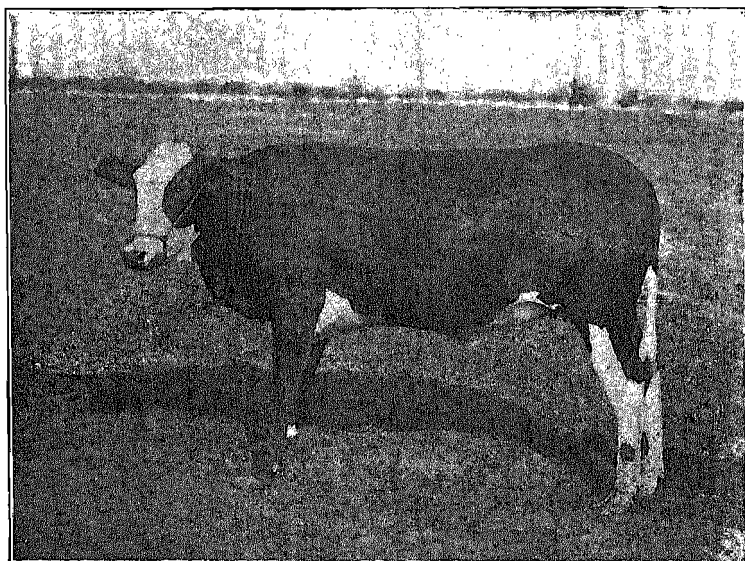
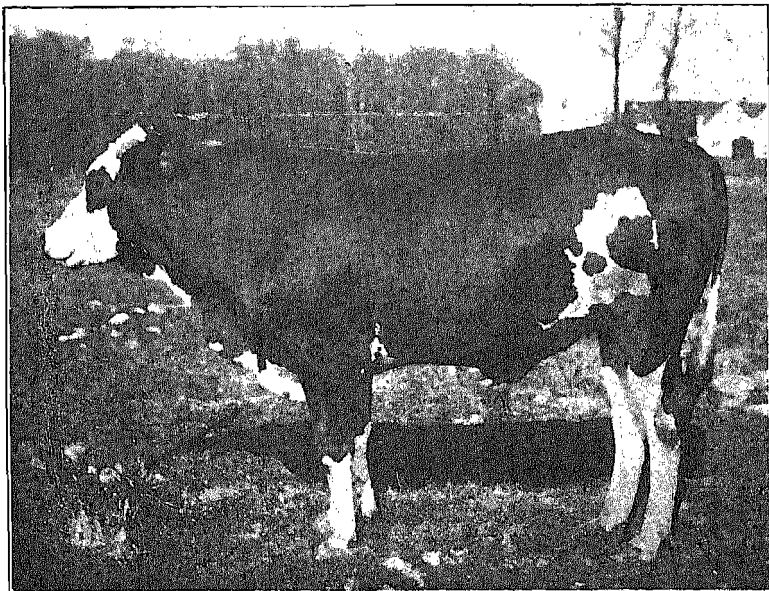
HALF-BRED BULL, AGED 2½ YEARS.
Undersized with pot-belly, rough coat and unthrifty-looking.
(Third generation cross.)



THIRL-QUARTER SCINDH-AYRSHIRE HEIFER



THREE QUARTER SCINDH-AYRSHIRE HEIFER



HALF-BRED ONGOLE FRIESIAN BULL AND HEIFER BORN AND REARED
NEAR HAMBURGH.

The Ongole Sire was exported to Germany.

OTHER MINOR BREEDS.

There are some minor breeds of cattle some of which have become extinct and these comprise—

Tiruchengode cattle.—In the Tiruchengode taluk of the Salem district, there was a breed of small cattle, the cows of which were very good milkers for their size. Nothing is known of their origin and no care was taken to maintain the breed with the result that today the breed is practically extinct, having become mixed up with other breeds. The breed somewhat resembled the small Mysore cattle. The cows gave 8 to 12 lb. milk per day. Lieutenant Holmes describes them as follows :—

Head—small, broad between the eyes, which are large and black, ears short, horns short, of average length, spreading outwards and slightly backwards.

Neck—short.

Hump—small.

Dewlap—thin and sparing and continuous to sternum only.

Back—moderate length rising towards croup.

Quarters—thin.

Sheath—tight.

Tail—reaching below hock and tapering.

Legs—short and strong.

Feet—small and hard.

Colour—predominating grey, red, black and other colours.

Punganur breed.—In the Punganur Zamindari in the Chittoor district, cattle-breeding and rearing is an important industry of the rural classes. This zamindari was formerly noted for its milch cows a very small breed of excellent milch cattle, and one still sees cows of a sort, being taken to the Ranipet weekly market for sale from here. The original breed has however practically disappeared. It is said that they were of Mysore origin. Ryots have found the sale of grown bullocks more profitable and have imported good bulls from Mysore to increase the size of their cattle, and thus most of the Punganur cattle are now crossbred-Mysore, which form a useful source of supply for the shallow mhote lifts of Chittoor and North Arcot districts.

Lieutenant Holmes of the Civil Veterinary department reports in 1901 that large numbers of Punganur cows were taken to Madras for sale and they yielded 8 to 16 lb. milk per day. They calved at intervals of 18 months. His description of them is :—

Head—large, horns vary in length and shape, as a rule are long and slope backwards. Eyes bright and prominent. Ears short and erect.

Neck—short and thick.

Hump—well developed.

Deuclap—extending to sternum only.

Body—short.

Back—slightly rising to croup.

Quarters—strong and sloping.

Sheath—tight. Cows have a fold of skin in the position of the sheath.

Tail—long.

Leg—short.

Feet—small and hard.

Colour—various and broken colours.

Deccani breed.—These are a breed met with in the Bhadrachalam taluk and adjoining territory of Hyderabad and the Central Provinces. They are said to be of mixed, local, Kilkaree and Mysore blood. They are a small breed, very hardy and average milkers suitable for light draught and road work. Work bullocks are imported to the Pennar Delta of Nellore and some to the Northern Deltas.

Description.

Head—average length forehead becoming narrow above the eyes, muzzle broad, ears of average length and slightly drooping, horns of moderate length springing upwards and in cows curved slightly inwards, sharp at tips.

Neck—short.

Hump—moderately developed.

Deuclap—deep and extending to sheath.

Body—compact.

Back—strong and level.

Quarters—strong and drooping.

Sheath—pendulous.

Tail—long.

Leg—short.

Feet—small and hard.

Colour—prevailing colour black, other colours red, grey, white and brown.

In Markapur taluk of the Kurnool district, a certain amount of cattle-breeding is still carried on. These are principally forest bred animals and were formerly known as "Dupad" cattle. Cattle-breeding here varies considerably. In some places cattle are depended on for the manure supply and, in consequence, breeding has greatly degenerated; so much so that mhote bullocks have

to be bought from outside. In other places ryots depend much more on their cattle for their livelihood; in addition to forest grazing, the breeding herds and young stock are fed with straw. Bulls are sold for good prices at the age of 3 to 5 years to the adjoining villages for plough work. Here also the ryots select their breeding bulls from their own stock, whereas, in many villages, bulls are bought for breeding purposes from Nellore dealers coming westward. In other villages again, bull calves are sold as yearlings to Nellore dealers. Cows are never used for work in this tract, and have in consequence no sale value. Bulls are never castrated until they are aged, in fact castration is considered a sign of old age, and greatly reduces the value of the animal. This is presumably a mixed breed probably a mixture of Ongole and some hill breed which has now become a fixed type, or it may be that, a new breed has been formed since the famine of 1868 (when it was reported that the breed practically died out), by the importation of Guntur cattle as bulls for the remainder of the breeding herds. The cattle have the pendulous ears, the white or piebald skin, the well developed dewlap, and the pendulous sheath, in the case of bulls, or the loose flap of the skin, in the case of cows, of the Ongole breed. The hind legs are also longer than the front giving the back an upward slope to the hind quarters, as in the Ongole. In other respects they differ considerably. In the case of bulls, the head is more like that of Alambady, with the same shaped horns, only shorter. The body is round and compact, like that of the southern cattle of the Cumbunn valley and the chest is broad. The legs are good and the feet are very large and are said to be very hard. In colour they vary considerably, from white to "maile" (grey) either brown or black "maile" and from "maile" to black or dark brown. Often also, they are broken red and white in colour. The bulls are quick moving and spirited and are an allround useful breed for draught purposes. The cows of this breed though smaller, bear a strong resemblance to those of the Kangayam breed, except for their more pendulous ears and the loose flap of skin at the naval. These are mostly white in colour with the same peculiar brown "maile" markings on the forelegs as is seen in the Kangayam breed.

The Yerramalai hills of Kurnool district, also breed cattle in considerable numbers which are used locally for the cultivation of lighter soils.

In the Cuddapah and Anantapur districts there are small centres of jungle breeding, of small sized cattle. These animals are however, of little use agriculturally, and are usually sold for fast trotting work for single bullock carts. One of these local breeds in the Kadiri taluk is said to be noted for its fast trotting bullocks and also for the fact that the male stock are castrated (not muled) when under six months old.

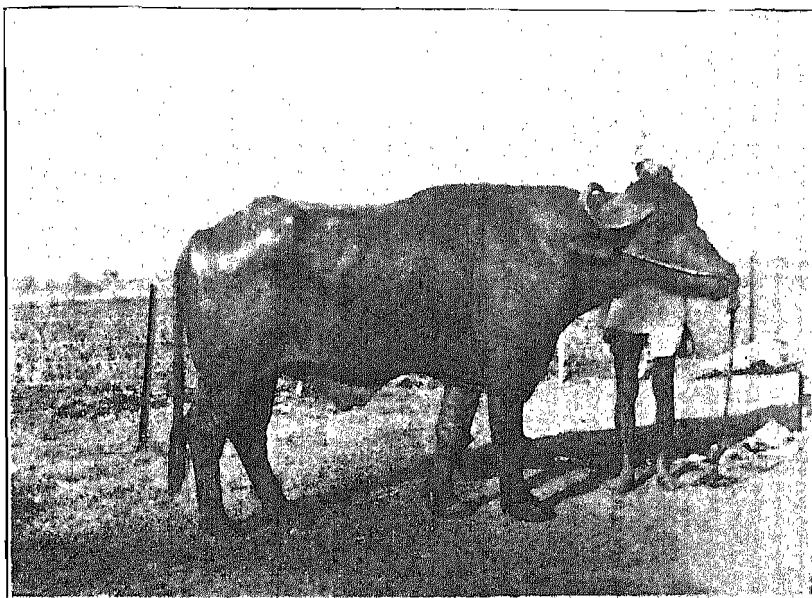
BUFFALOES.

The buffalo stands next to the ox in its utility to man, and still exists in a wild state in large numbers. There is scarcely an animal upon which domestication has made so little impression as the buffalo, and yet, it is universal and found all over the Presidency, distinguished by its large flat horns, some curved and some long, measuring sometimes as much as five and six feet in length. The colour varies from a black to a light slate colour, with very scanty hair, but with tufts of hair in various parts of the body.

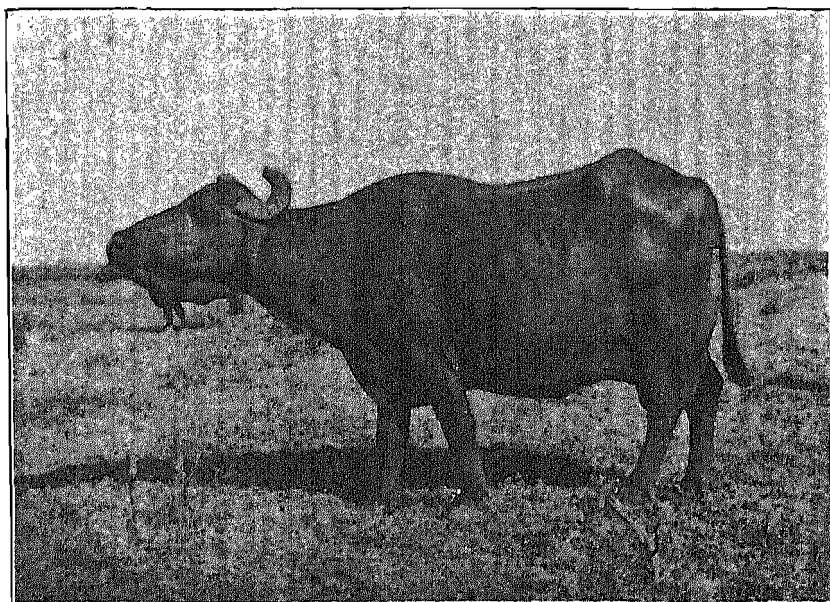
These animals are very largely used where wet cultivation is in vogue. Although slow, they are excellent workers, particularly in the ploughing of paddy fields and working sugar mills.

In Southern India, there are probably four distinct varieties, viz., the Toda which are found on the plateau of the Nilgiris hills, the Parlakimedi on the Ganjam hills on the East Coast, Malabar, the best which are to be found in the south-west portions of that district and the South Kanara, and the small nondescript variety which may be seen anywhere.

Buffaloes are mainly kept for milk purposes, and in most parts instead of the bull calves receiving more attention, as in the cases of cattle, it is the heifer calf which is more carefully looked after. Thus in only a few localities are good draught buffaloes to be found, and these are only in such places where they are used for heavy draught. The Wooda or stoneworker caste, who are found throughout the Presidency, almost invariably use male buffaloes for dragging stone, and these people usually own fairly good draught animals. The buffalo is a much more powerful draught animal for its size than the bullock, but is much slower and where very heavy draught and short leads are required, they are often used; such as for carting timber out of the forests. They are also used where power is more important than speed, such as for working cane mills and very occasionally for mhoote work. It is said that the buffalo bullock does not stand up to work on the plains so well as the bullock; the midday sun affects it therefore it is not usually worked in the middle of the day. The best male buffaloes are to be seen in the northern districts of Ganjam and Vizagapatam. In South Ganjam and Northern Vizagapatam, the buffalo is regularly used as a draught animal by all classes, and for ordinary bandy traffic, they are much more common than bullocks. This is the only part of the Presidency, where ryots, who breed buffaloes pay more, or as much, attention to the rearing of male, as they do to the rearing of female stock, and as a consequence, this is the only part of the Presidency, where indigenous male buffaloes are really good. This excepts the Toda buffalo of the Nilgiris which can hardly be considered as an agricultural breed.



DELHI BUFFALO BULL.
Aged 3 years.

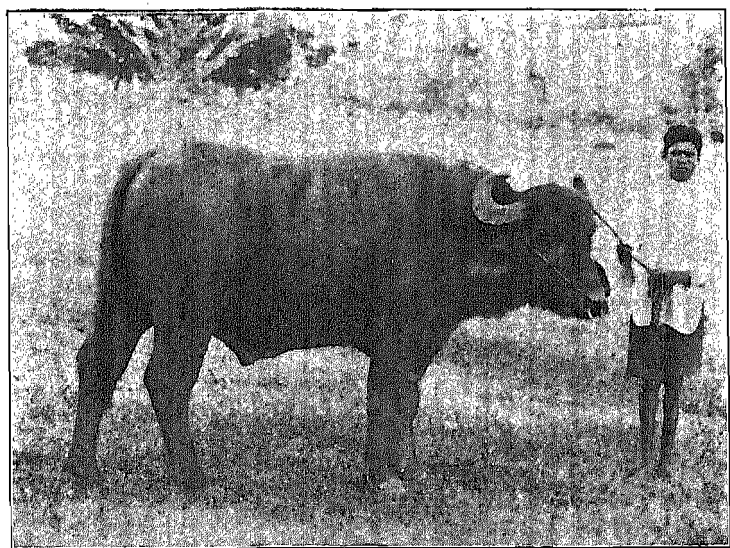
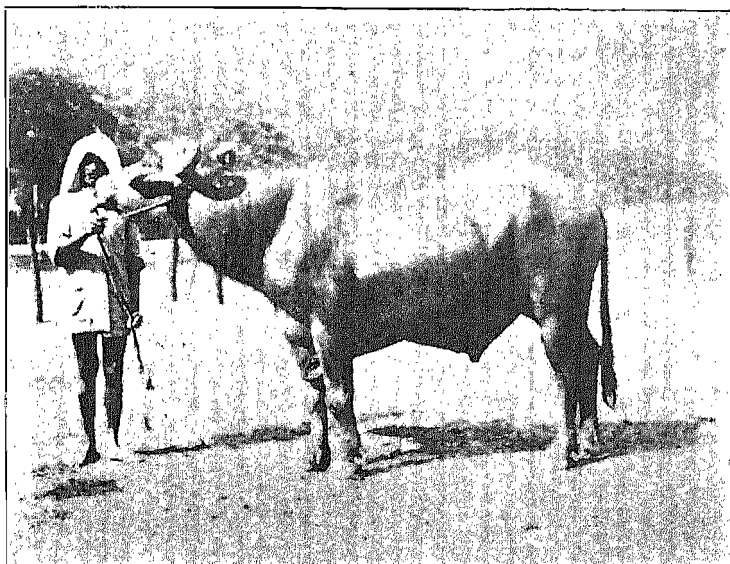


MURRAH BUFFALO FROM KARACHI.
Milk yields.—5,910 lb. Daily average 16.9 lb.
9,610 lb. „ „ 18.9 lb.

According to the report for 1930-31, the total figures show that there are only 1,354,894 male buffaloes as against 2,765,694 cow buffaloes and the only districts where the male buffalo is in excess of the female, are Ganjam, Vizagapatam, Malabar and South Kanara. Taking the ghee producing districts of the north, viz., Guntur, Kurnool, Bellary and Cuddapah, these own only 141,231 male buffaloes as against 733,986 she-buffaloes, or in the proportion of 1 to 5. In the cattle census of 1909-10 for these districts there were 106,781 male-buffaloes as against 590,197 she-buffaloes, or in the proportion of nearly 1 to 6. The number of male-buffaloes has increased during the last twenty years. It is generally allowed that the mortality amongst male-buffalo calves is much higher than amongst heifer calves, but even allowing for this, the difference in numbers between male and female stock points to very large exports, the bulk of which find their way to the wetland tracts, where they are used for wet cultivation. They are not so much used in the Godavari as in the Kistna district, some taluks in the north of the latter district using large numbers. They are a cheap means of draught and are not much loss if they do not last long. They are largely used in the Pennar Delta of Nellore district and large numbers are taken from the Cuddapah district as far south as the southern taluks of Chingleput. Coimbatore and Salem, the two main ghee producing districts of the south supply the bulk of the male-buffaloes to South Malabar, where they are in great demand for wet cultivation. Coimbatore district is, practically, depleted of all its male-buffaloes, there only being 9,626 in the whole district against 121,202 she-buffaloes, or in the ratio of 1 to 13. Here again, the number of she-buffaloes have increased from 95,000 in 1909-10 to 121,000 in 1930-31, whereas the number of male-buffaloes has remained about the same. The moist climate of the West Coast suits this class of stock, and it would be difficult to recognize young animals which have been here for a year or two, as the same stock as those which come over from Pollachi. South Kanara which also uses buffaloes for its wet cultivation, depends chiefly on Mysore for its supply. These are brought down in very large numbers to the annual fair at Subramanya.

Many buffaloes in parts of this Presidency are much neglected and are maintained in a semi-starved condition, hence they never grow into strong animals, being puny in size and irregular breeders. It is common to see them eating village refuse and other filth.

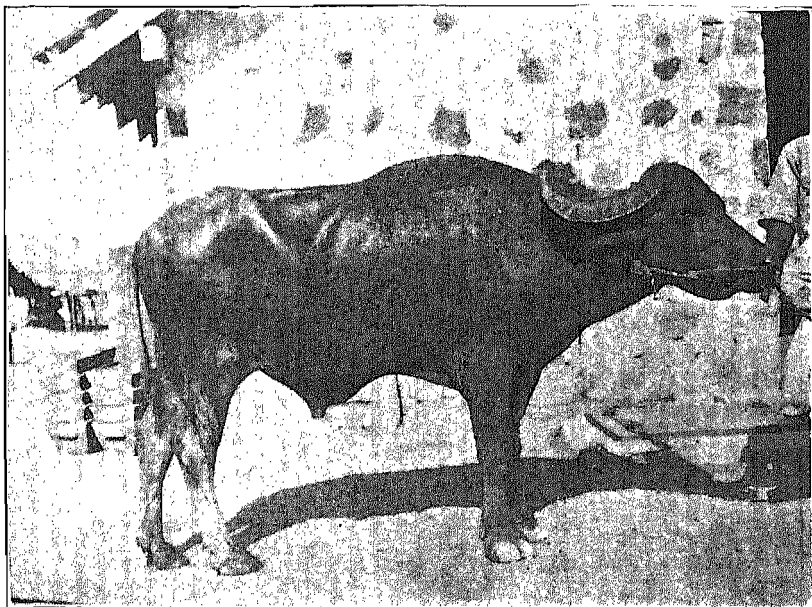
In Malabar there are herds of buffaloes which are bred and reared in the forests. When the cow calves it is brought to the homestead and milked. Milk is sent from one village near Iritty to Cannanore daily. These buffaloes are of good size and maintain good condition.



DELHI BUFFALO BULLS.

The buffalo supplies more than half the demand for milk in the Madras City. In 1916-17 there were 2,944 registered buffaloes, in 1932 the number has increased to 4,068. The buffalo cow in milk is usually fairly well fed, almost all the calves in Madras City are much neglected and a very large number die. She-buffaloes generally milk without their calves, and on that account the calves are looked on as a nuisance and are maintained in a semi-starved condition.

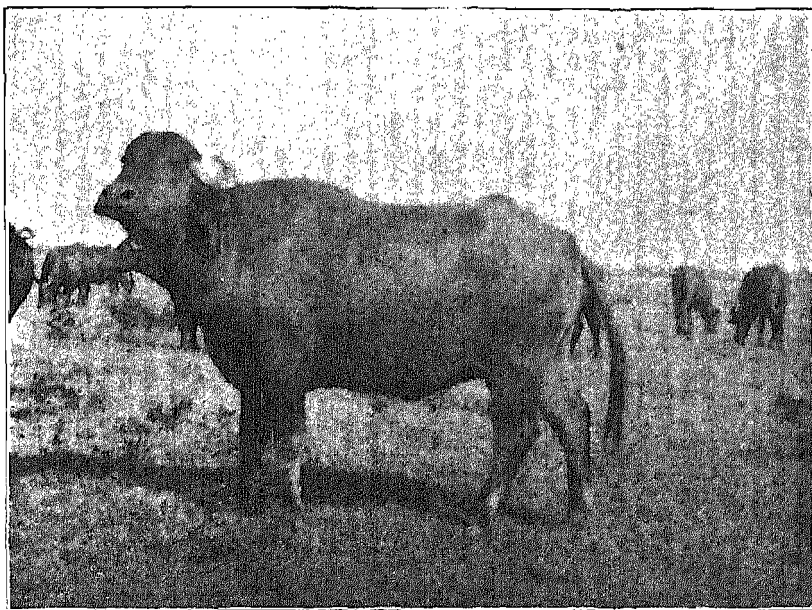
The district around Coimbatore is well known for its good buffaloes. The people take interest in their animals and there is a good trade in the sale of milk and cream. Several creameries have opened up around Coimbatore town, milk is purchased and separated, the cream is sent to the Nilgiris for butter making and the separated milk is sold to coffee hotels, etc.



HALE-BRED DELHI BUFFALO BULL.

Delhi buffalo bulls have been stationed at the Agricultural College Dairy for the last 15 years with the result that the breed of buffaloes for a radius of 10 to 15 miles has been improved from the point of view of milk yield and size. Ryots have brought their she-buffaloes from a distance of 10 miles to have them covered by a Delhi bull.

A good she-buffalo in this district after calving will fetch from Rs. 80 to Rs. 100 each or more according to milk yields.



THREE-QUARTER-BRED DELHI BUFFALO NO. 20.
Highest yield.—6,115 lb. milk with a daily average of 14.5 lb.



TODA BUFFALOES.

The Madras Government maintain buffalo breeding bulls of pure Delhi and Delhi cross for the benefit of the public in various towns in the Presidency such as Madras, Guntur, Coimbatore, Pattanabi, Koilpatti, Taliparamba and Hagari. Young bulls and heifers are sold to ryots in the districts.

Toda buffalo.—The Toda buffalo is pretty well known to the frequenters of the Nilgiri hills where each Toda mund possesses a herd. They differ from the kind generally met with on the plains, and appear to be indigenous to those hills alone. They are of exceedingly powerful build and long in carcase, they have scarcely any hump; the chest is broad and deep; the legs are short and sturdy; the head large and heavy, and surmounted by horns set wide apart and curved differently to those of the animals seen on the plains, the points being recurved inwards, outwards and forwards. They carry their heads low, and from this peculiar curvature of the horns it gives them at first sight a bull dog appearance. Along the crest of the neck, hump and back, there is a thick growth of hair like a mane which imparts a bison-like appearance to them. They are known to be fierce and rather dangerous to approach incautiously. At the sight of a stranger they throw up their heads, run back for some distance, when they abruptly halt, and turn towards the object of their fears, at whom they fiercely stare with heads erect, cautiously advance, and retire, then gather together in a compact mass prepared for attack.

At other times the whole herd starts suddenly into an impetuous rush with their heads down, and overrun, gore or trample to death the object that has excited their anger. In this manner, tigers and other beasts of prey are often kept at bay, or killed by the simultaneous rush of the herd.

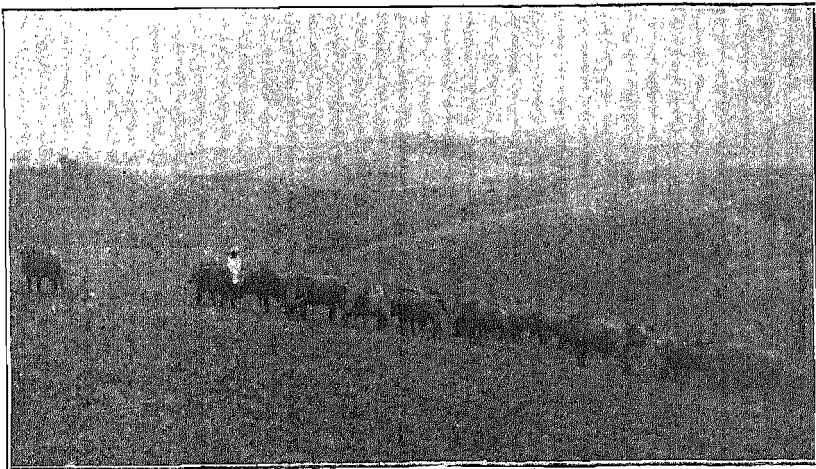
They are good milkers, yielding daily from 10 to 20 lb. of very rich milk. The milk has an unusually well flavoured taste. Beyond this, they are put to no other use whatever.

The cows are milked both at night and in the morning, but the principal dairying operation is conducted before sunrise. The "Tuel" or pen is a circular enclosure varying in size according to the numbers comprising the herd, built of loose stones with a single entrance guarded by powerful wooden stakes in which the herds are shut in for the night. It is generally located in some sheltered spot, and embanked to the height of three or four feet. During the heavy rains the windward side of the pen is bushed with brushwood to protect the herd from the cold and piercing winds. These pens have no covering whatsoever, the cattle are exposed at all seasons to the rains and sun, while the floor is covered with an accumulation of their own droppings. The young calves however, prior to their being weaned, are very carefully looked after, and kept under shelter at all time. During the day

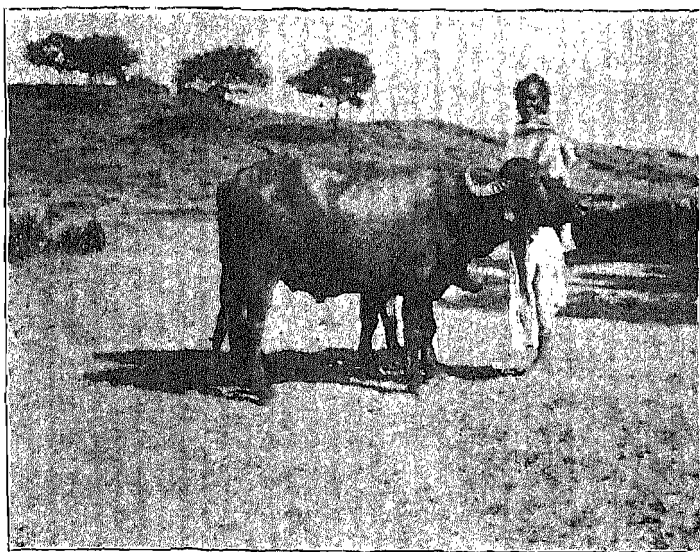
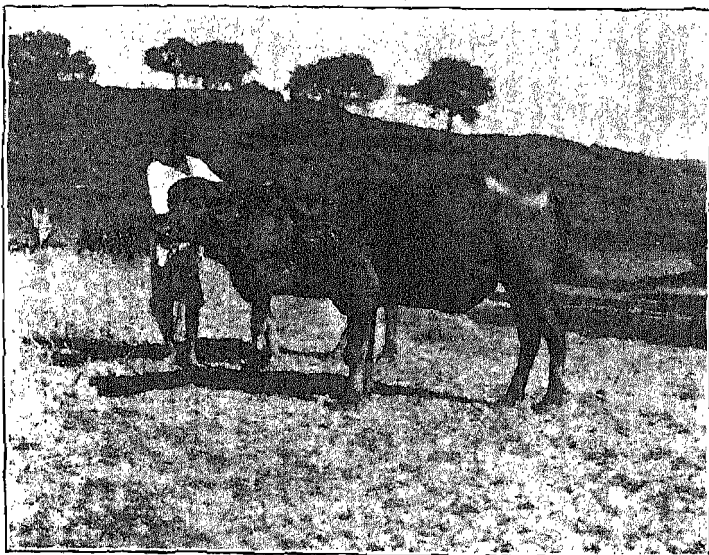
the calves either accompany their mothers or are grazed separately in charge of an attendant. The Toda buffalo enters very largely into the ceremonials of this peculiar people who interest all visitors to the Nilgiris. The Todas have no history, no written character, and only a very elementary language. They are supposed to have lived on this plateau for upwards of 800 years, and their only means of livelihood is the keeping of herds of buffaloes. Before the advent of the British Government, they were considered to be "lords of the soil," but when the encroachment of the town of Ootacamund began to envelope the grazing lands of these people, the question of the title was fully gone into, and now, the Todas have become tenants of the overlord. Under the recent survey it was arranged that about fifty acres of land, ordinarily to a considerable extent wood-land, should be demarcated as the site or reserve of each mund or homestead, the total being about seventy. On this, the Todas pay an assessment of two annas per acre, the lowest under the present assessment, and this is the only tax they pay.

Soon after the birth of a child a young buffalo calf is brought into the presence of the family. The father takes three measures and pours water from the third measure into the other two holding them close to the hind quarters of the calf on the right side. The meaning of this singular rite is not clear, but it probably has reference to the future supply of milk for the infant's sustenance.

Early betrothals are common among Todas, and an interchange of buffaloes takes place. At the funeral a small herd of buffaloes is driven along with the *Cortège*, and all the friends of the deceased



TODA BUFFALOES.



PARLAKIMEDI BUFFALOES.

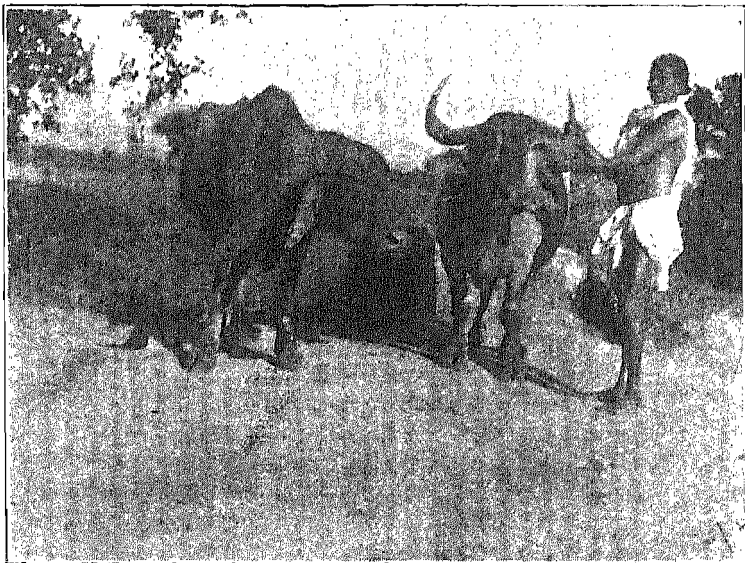
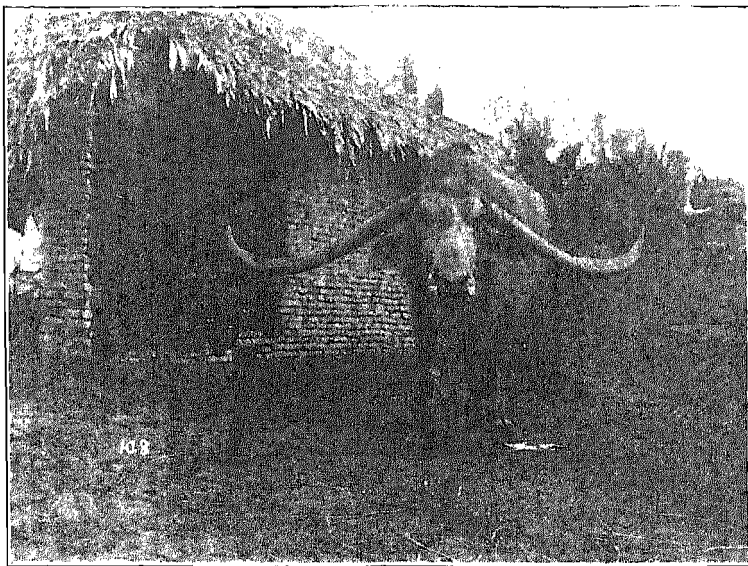
and neighbouring villagers, to do honour to the dead. Arrived at the place of burning each buffalo has a little bell hung round its neck, and they are driven close to the pile with the words "Araa Od Atu"—'go with him.' Then all the mourners take handfuls of earth and throw them at the buffaloes, and afterwards ask the corpse whether they may kill buffaloes for it.

There is an annual ceremonial in commemoration of all those who have died during the year. During the first day, the animals intended for sacrifice are driven in where they are safely enclosed in a kraal, two or three for each of the dead to be commemorated. The youngmen now throw off their blankets and rush among them hanging on to the animals by their horns and neck, whilst a bell is hung on to the neck of each. On the second day the bier is brought out, a hole is dug at the entrance of the kraal and the priest does 'Puja.' After this, the Pujari approaches with garlands of creepers which he throws at the buffaloes. This is the signal for the "*Coup De Grace*." The poor terrified creatures who have been half maddened by the treatment which they have already undergone from the young men who have spent the preceding hours in exciting them in every way, rush madly about and sometimes leap the kraal wall, and make their escape to some distance before they can be caught and despatched. The bodies are dragged back and placed in a line with the bier beside them, and mourned.

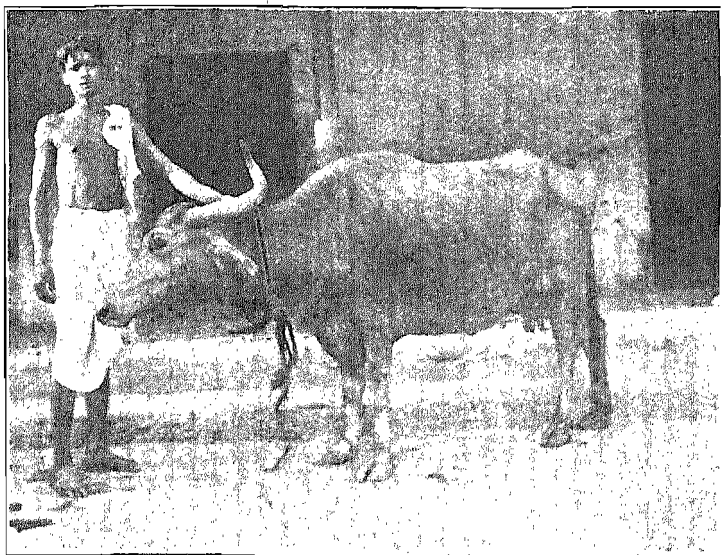
What follows next is weird and cruel, and the Todas evidently fear that Government may prohibit it on the score of cruelty, for they "make a secret" of this part of the proceedings. A buffalo cow and calf are produced, the latter is held by three men while the former receives a blow between the horns which stuns without killing her. A gash is then made under the forelegs of the poor animal, and the *Varzhal* or inferior priest, dipping some pieces of bark into the wound, gives some of the blood to the kinsmen, who smear it upon the "bier" saying at the time "may the sin run away."

Formerly there used to be reckless slaughter but Government has stepped in and stopped it on the ground of the cruelties practised. None were gainers by the deaths of these poor animals except the Kotas who attend on these occasions as musicians, and they claim the carcasses of all the buffaloes. When the Todas are asked why they give the Kotas all the carcasses, they exclaim "when the buffaloes are alive, they are ours, when they are dead they are the Kotas'."

The Ganjam and Parlakimedi buffaloes.—The buffalo of Ganjam and Vizagapatam is the only really useful general purpose breed in the Presidency. The local breeds are usually light coloured



GODAVARI BUFFALOES.
Note length of horns.

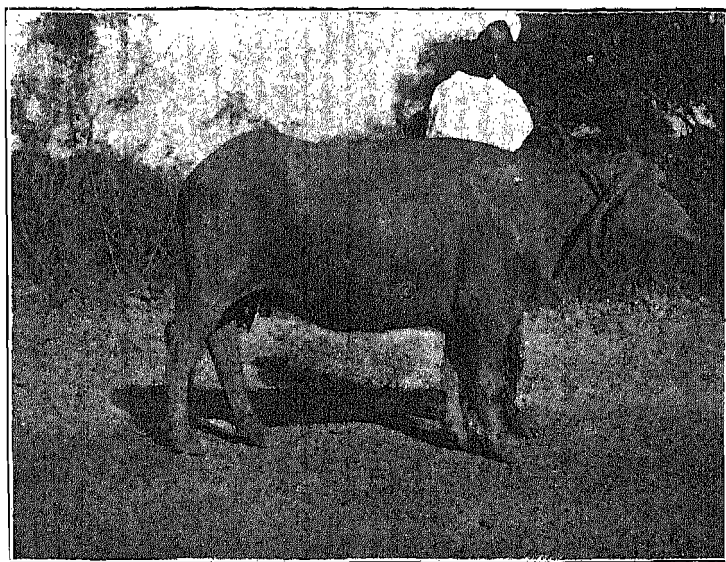
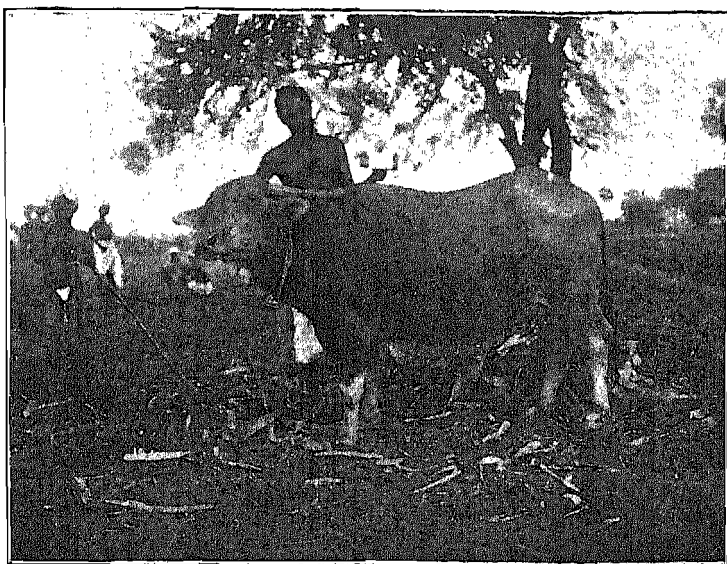


SHE-BUFFALOES.
Godavari district.

animals with grey hair and reddish skin and light yellow tufts of hair on the knees and fetlocks. They are said to be harder and to last longer than what are known as the "Kinedi" buffaloes, which are equally powerful-looking animals and much more striking in appearance, with their black skin and hair, their prominent wide forehead and their short curled horns; these latter are imported into the Presidency from Sambalpur. The local animal has thick long horns, nearly straight with a slight upward curve, and good specimens when full grown will often measure nearly three feet across the back with corresponding depth and breadth of the chest. Large numbers of young animals are brought for sale to the markets of Chintada, Ungrada and Sundarapuram, which are bought by ryots for rearing. Very fine full grown animals are also brought to the same markets for sale to dealers who take them south. Such animals will often fetch from Rs. 150 to Rs. 200 a pair, even higher prices are paid for exceptionally good pairs. These latter are mainly bought by local rich ryots, who pride themselves on their buffaloes, in the same way as the black soil ryot of Kurnool prides himself on his bullocks. Here again, the heavier rainfall of these districts suits the buffaloes. It is difficult to understand how such a fine breed is maintained. On enquiry, it was stated that breeding bulls are never kept and the services of cows are dependent on young bulls, which have not been mulled, or on older animals which have not been properly mulled. This seems to point to the fact that the breed could be greatly improved if care was taken in breeding; and that throughout the Presidency more use could be made of the male-buffalo if he were properly reared and fed. The she-buffaloes from this tract are better milkers than the ordinary country buffalo and they realize a better price, the average milk yield being estimated on the average at about 2,500 lb. per lactation.

Three distinct breeds of buffaloes are found in the Parlakimedi part of the Ganjam district, namely, the "Desi" or "Manda," the "Jerangi" and the "Peddakimedi" breed. The buffaloes commonly met with are the "Desi" or "Manda" breed. They are larger than the animals found elsewhere in the district, and some of them are imported from the Kalahandi State. In colour they are dark grey. The buffaloes of the "Jerangi" breed are smaller, and have short horns and short tails. They are noted for their hardiness and smartness; and they are somewhat darker than the "Desi" breed. "Jerangi" is in the Parlakimedi Maliahs, and it is here where most of these animals are bred.

The "Parlakimedi" buffaloes are much larger and stronger than those of the Desi or Jerangi breeds. They cannot however stand the sun so well but are exceedingly useful for slow heavy work. It appears from such information as is available that they



SHE-BUFFALOES.
Godavari district.



YOUNG BUFFALO BULLS.
Godavari district.

are brought by the Peddakimedi people from Kalahandi and other parts of the Sambalpur district of Orissa, and are not bred in Peddakimedi. Cow buffaloes of Jerangi and Peddakimedi breeds are rarely met with outside their native borders, as they do not fare so well, nor do they yield as much milk as they generally do when found in their native tract, on account of change in food. These two breeds are not therefore very frequently met with outside their own country, and apparently no attempt is made to produce a mixed breed with "Desi" cows and "Jerangi" or "Peddakimedi" bulls.

Buffaloes are largely used for agricultural purposes and for heavy draft work which the bullocks of these parts are incapable of performing. On the Parlakimedi Estate the ryots keep a far larger number of buffaloes than bullocks, as the former are the more useful for preparing land during the rains for transplantation of paddy. No special care is taken, nor is it necessary to provide pasture for the animals, as in addition to the grazing lands and cultivated lands after the crops are out, plenty of fodder (paddy straw) is available in every village throughout the year, and this with ricebran, horsegram, and gingelly oil cake, which is generally given, is sufficient to sustain the animals in good condition. What is absolutely necessary in regard to these animals is that they should be washed twice daily. Young bulls sell from Rs. 40 to Rs. 100. A good cow is worth from Rs. 30 to Rs. 60 according to the milk she yields. A cow-buffalo is generally considered to be one of the requisites of a family as she helps to support the family by yielding plenty of milk and ghee. A good cow-buffalo gives from 12 to 18 lb. of milk daily at her best.

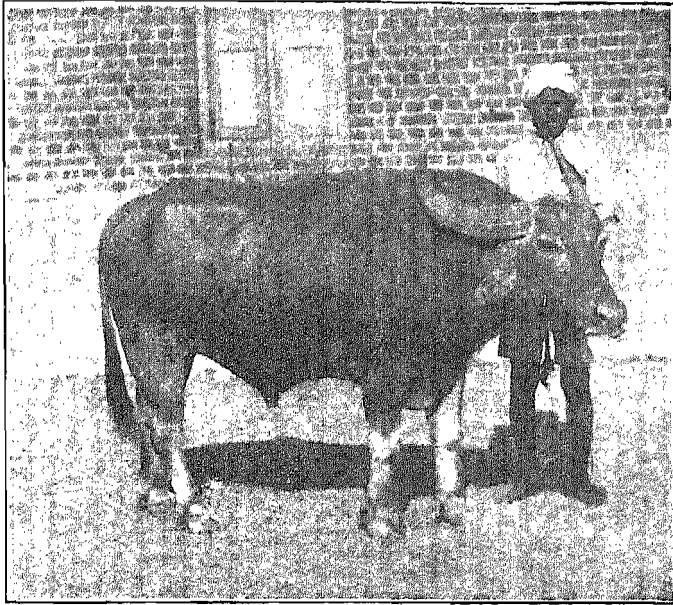
Several poor families earn their livelihood solely by maintaining one or two cow-buffaloes and selling milk, curd, butter-milk and ghee. The regular dealers in milk and ghee who are called "Gowdus" maintain herds of cow-buffaloes. The herds do not contain very many fine specimens. These are always kept outside villages and towns, and live on the grazing they can get in fields and jungles. They are not given any ricebran, horsegram, oil cake, etc., and are rather wild. There are weekly fairs held at Uppalada and Balada, where some very fine animals are brought for sale. Many animals are purchased for export to other taluks in the district, and also the adjoining districts. The following are some of the signs which are believed to be good in a cow-buffalo:

- (1) The head should be small.
- (2) The back should be low.
- (3) The forelegs should be shorter than the hind legs.
- (4) Horns should be formed in such a curve so as not to allow water which may be poured over them to fall on the hoofs of the forelegs when the animal is standing.

The chief feature that is looked for, and to which much importance is attached in the bull-buffalo is the formation of the horns. If the two horns are of equal length bending backwards with tips facing each other, this is considered to be a good specimen. An animal that stretches out its tongue and turns it from side to side is said to have "Pamy Naluka" (snake tongue) and is considered to be destructive to the owner. So also is the animal which strikes, with its horns, the post to which it is tied, the action being called "Kommu kottadam" (horn beating).

South Kanara buffaloes.—There is a sect of Hindus known as Jain Bants who own a fine hardy breed of buffaloes and some of the best may be seen in the neighbourhood of Mangalore on the West Coast. The nature of the cultivation carried on in this part of the country necessitates the use of these animals as the indigenous cattle are small and insignificant. Buffalo racing forms one of the great amusements of these people, and every rich Bant keeps his "Kaumbla" field sacred to buffalo racing, for the details of which we are greatly beholden to Mr. Thurston. The best pairs of buffaloes used for this purpose are valued up to Rs. 500, and are splendid animals and except for occasional plough drawing, are kept for racing all the year round. Each pair of buffaloes run the course alone and is judged by the assembled crowd for pace, style, and most important of all, the height and breadth of the splash which they make. Sometimes a kind of gallows, perhaps twenty feet high, is erected on the course and there is a round of applause if the splash reaches up to or above it. The course is generally a wet paddy field about 150 yards long, full of mud and water. The driver stripping himself to the necessary minimum of garments mounts a little flat board about 12 by 18 inches, on which is a small elevation or stool. His friends hold on to the buffaloes for all they are worth, and he places one foot on the stool and one on the pole attaching the so-called car to the yoke, his whip is held aloft in one hand, and one of the buffalo's tails in the other. He has no reins. In this way, he comes down the course shouting with all his might with the plank on which he stands throwing up a sort of Prince of Wales feather of mud and water round him. He has frequent spills, but the falling is quite soft and it is seldom that any one comes to grief. Marks are given for the pace, style, sticking to the plank and throwing up the biggest and widest splash. At a big meeting perhaps a hundred pairs will be entered brought from all the surrounding country and the big men always send their buffaloes to the races headed by a local band.

Buffalo Breeding Station, Guntur.—The Madras Agricultural Department maintain a farm of 150 acres of grazing land at Lam near Guntur. The farm was started in 1923 and the few buffaloes



BUFFALO BULL (6 YEARS).
Godavari district.



KANARESE RACING BUFFALO.

of Delhi and halfbred Delhi buffaloes from the Agricultural College transferred there. The pure Delhi bull is used to grade up this herd, the object being to improve both the size and milk yielding capacities of the country buffaloes. Bulls for breeding purposes are sold annually to ryots and co-operative societies. Stud bulls for the service of outside she-buffaloes are maintained on the farm and the demand for these is very great. The price of a good bull is from Rs. 100 to Rs. 130.

The she-buffaloes are fed on concentrated food plus fodder. They are turned out daily into the grazing area where there is a tank for them to wallow in. In the summer months water is very scarce. The calves are allowed to suckle their dams, each she-buffalo is milked out fully both morning and evening on one day each week in order to ascertain the daily yield of milk. On the other six days in the week, the surplus milk above the requirements of the calf is milked out and the calf is allowed to suckle the remainder. Calves are allowed from 6 to 8 lb. milk daily up to the age of six to seven months. The surplus milk is sent out into the Guntur town morning and evening for sale.

The average yield of the Delhi and Murrah buffaloes is 4,800 lb. with a daily average of 14.1 lb. The highest yields are 9,610 lb. with a daily average of 18.9 lb. and 7,156 lb. with a daily average of 16.9 lb. Eight animals in this herd have yielded over 5,000 lb. milk in a lactation, the average number of days dry being 201, the shortest dry period being 118 days and the longest 342 days. The average number of days in milk is 344.

The average yield of the $\frac{3}{4}$ Delhi buffaloes (omitting 2 poor milkers) is 3,684 lb. with a daily average of 11.6 lb. The highest individual yields in this herd are 6,116 lb. with a daily average of 14.5 lb. and 5,425 lb. with a daily average of 14.6 lb. The average number of days dry is 178. The average length of the lactation is 317 days. This herd includes a number of young animals.

The average yield of the half-bred Delhi buffaloes is 3,616.3 lb. with a daily average of 10.7 lb. All these buffaloes have passed their fifth lactation and so have reached their maximum. The highest individual yields in this herd are 5,932 lb. with a daily average of 11.4 lb. and 4,896 lb. with a daily average of 14.2 lb. The average length of the lactation is 338 days and the average number of days dry 196.

Taking the whole herd together, the average milk yield is 4,033 lb. in 333 days with a daily average of 12.1 lb.; the average number of days dry 192.

The average weights of the calves at birth are :—

Calves.					Bull.	Heifer.
					LB.	LB.
Delhi	..	..	..	..	75	72
$\frac{7}{8}$ Delhi	..	..	..	..	69	67
$\frac{3}{4}$ Delhi	..	..	..	..	69	57
$\frac{1}{2}$ Delhi	..	..	..	..	66	62

Heifers are served at the average age of 2 years and 8 months and the average age at first calving is about 3 years 6 months.

All the cross-bred Delhi buffaloes are much larger in size than the country animals, are better milkers and maintain condition fairly well.

The price of an average crossbred she-buffalo varies between Rs. 80 and Rs. 180.

The fat percentage varies between 7 and 8 per cent

The yields of some of the she-buffaloes are given below :—

Number.	Breed.		Number of lacta- tions.	Average milk yield.	Average daily average.	Maximum milk yield.	Daily average.
				LB.	LB.	LB.	LB.
3	Delhi	..	4	4,977	12.5	5,341	16.4
6	Do.	..	6	4,904	14.5	5,715	16.1
8	Do.	..	5	4,210	13.7	5,885	15.4
54	Murrah	..	2	7,760	17.9	9,610	18.9
55	Do.	..	2	6,878	15.1	7,156	16.9
58	Do.	..	2	4,678	16.6	5,009	15.8
62	Do.	..	1	5,289	12.4	5,289	12.4
39	$\frac{7}{8}$ Delhi	..	3	4,860	12.7	5,462	13.9
40	$\frac{7}{8}$ Do.	..	1	6,393	15.2	6,393	15.2
20	$\frac{3}{4}$ Do.	..	6	5,043	14.7	6,116	14.5
21	$\frac{3}{4}$ Do.	..	4	4,274	12.8	5,105	15.7
9	$\frac{3}{4}$ Do.	..	2	4,724	12.9	5,425	14.6
2	$\frac{1}{2}$ Do.	..	8	3,728	10.6	4,562	15.2
12	$\frac{1}{2}$ Do.	..	5	4,850	12.6	5,932	11.4
14	$\frac{1}{2}$ Do.	..	6	4,315	10.8	4,897	14.2
15	$\frac{1}{2}$ Do.	..	7	3,781	10.6	4,623	9.4

CATTLE TRADE.

The trade within the 4 northern districts is in the hands of petty dealers, who seldom deal with more than 10 pairs of good cattle, or more than 100 calves, on their return trip. They trade between the markets of Chicacole taluk to as far south as Palacole and Pentapad in Kistna district. The breeding season starts in December, and continues for about 7 months; the dealers bring down superior cattle, either buffaloes or bullocks, into the various markets and there they are sold or exchanged. Young calves are purchased from Guntur, Kistna and Godavari districts and are taken back and sold to ryots in Vizagapatnam district. This trade in superior cattle lasts for 2 months and then declines, and inferior animals useful for wet cultivation are brought down, this trade increases gradually until June. All the time, young calves are being imported in increasing numbers until the rains commence.

The shandies of Sundarapuram, Chintada and Ungrada are principally buffalo shandies and the supply is mainly local and consists of all ages. "Kimedi" buffaloes are all full grown animals and are chiefly brought to the Sundarapuram market and a few to the Chintada market. Vizianagram is more of a dealers' market as far as buffaloes are concerned, but ryots bring in large numbers of very fine bullocks. The buyers are either dealers trading southwards or ryots from Godavari and Kistna. The prices are lower and there is better selection to choose from than at Pithapuram and the southern markets. Pithapuram, being on the edge of the delta, is a very big market for wet-land cattle. The markets in South Godavari and North Kistna consist of the remnants which are left over from the northern markets and also middle-aged animals brought in by local ryots for sale or exchange. A few cattle from the Godavari Agency and Kistna dry taluks are also brought in for sale.

The whole of the cattle trade of Nellore, Guntur and the Ceded districts is in the hands of the Nellore dealers except for the buffalo trade and a little trade carried on by petty cattle dealers from the Yerranalais in the Kurnool district. The Nellore cattle dealers are all Reddis, they have several branches of their trade with several different kinds of stock, but the system of trading is the same throughout. Cattle are sold on a three-year instalment system and payments are not complete until the third year, the ryot giving a promissory note for the amount of the purchase price. A headman or "Sirdar" and his men go to the exporting tract and travel from village to village purchasing their herd, which, when purchased is taken to the importing tract. Here the cattle are taken from village to village halting at well-known centres where they are sold. A trip to the Ceded districts is usually reckoned

as 6 months. Separate men are sent to these villages to collect money due. The accounts are settled at the end of 3 years when the profits are shared.

The several branches of the trade are as follows :—

- (1) The Bhadrachalam trade, i.e., importation of wet-land cattle to the Pennar delta. These are forest-bred untrained cattle reared by the Sugalis.
- (2) The East Coast export trade, i.e., purchase of yearling bull calves in Nellore, Guntur and Kistna districts which are taken to the Ceded districts for sale to the black soil ryots. Cattle of South Nellore are taken to Cuddapah and those of North Nellore, Guntur, etc., are taken into Kurnool and travel the northern part of the Ceded districts as far west as Adoni.
- (3) The Bangalore trade, i.e., the import of young as well as full grown, working bullocks into the Ceded districts chiefly into Anantapur and Bellary.
- (4) The importation from the Central Provinces and Hyderabad of small full-grown bulls into the North of the Ceded districts and beyond as far as Dharwar. These are untrained forest-bred cattle.

This trade being almost entirely in the hands of Nellore dealers, there are very few cattle fairs and markets in this tract.

South Nellore dealers also trade in milch cattle, their petty agents travel from village to village, selecting cows and buffaloes for purchase, settling the prices and giving small advances. When a sufficient number have been selected, the dealer inspects the same and if suitable pays the purchase price and takes the animals to Madras. He rests the animals outside Madras until they have recovered from their journey, etc. Dealers from Madras come out and inspect the animals and test the milking capacities, they bargain with the Nellore dealers for so much a head, giving an advance on the whole herd. The animals change hands and the Madras dealer commences to sell sometimes for cash but usually for credit. The latter is a great burden on the retail milkman who has to repay the purchase price in fortnightly or monthly instalments and has to give a promissory note for from 25 to 100 per cent over the settled purchase price. At the same time he has to supply the dealers along with his relations and friends, with meals, etc., until the amount is paid. Thus the milkman is always in debt to the dealer, he has to sell his cows when they go dry and purchase fresh ones from the dealer. It is easy to understand what temptation there is for the milkman to adulterate his milk, etc., and to neglect his calves.

Besides this East Coast trade, Arkonam and Conjeeveram dealers import she-buffaloes from the Ceded districts into Madras.

It is estimated that about 5,000 milch animals are imported annually into Madras, many of these are sold to the butchers, when dry, while a good number of the calves die, especially buffalo calves. Thus the progeny of the best milking stock of the Presidency is lost.

There is a considerable trade in he-buffaloes from the Ceded districts, which are taken to wet villages in these districts and also to Nellore and Chingleput districts for wet cultivation.

The cattle trade in the southern half of the Presidency is essentially different from that of the Ceded districts. Cattle fairs and weekly cattle shandies are common here and a lot of petty dealing is carried on. The Janappa Chettis of North Arcot and Salem are the biggest traders and they purchase cattle from the rearing tracts of North Salem and Mysore, they sometimes purchase their animals on credit, giving small advances and paying the balance when they have sold the animals. A few rich Vellala dealers in South Salem who work with a big capital are able to get the very pick of the trade. Some Muhammadan dealers trade largely but they deal in an inferior class of stock. The Telugu Chetties of Pollachi and Palghat taluks and the Maduvandies of Coimbatore district are also important castes of cattle dealers. They visit weekly cattle markets and export to the West Coast; they also import cattle from Mysore into West Coimbatore. The black-soil ryot of the south often sells his animals when middle aged and these are said to make excellent milch bullocks when again taken to the Coimbatore district.

The annual fairs in the south are mainly for full grown cattle. Mysore and North Salems are the chief attractions, but a considerable number of Kangayams are also taken. The Chetties who deal in Mysore or Alambadu cattle usually make four to five trips in the season and while they are away on one trip, their relations or agents are collecting animals for the next. The trading season commences in December at the Tiruvannamalai fair in North Arcot and unsold animals are taken to Samayavaram fair near Trichinopoly at the end of December or early in January. The second trip commences at Mailam fair in South Arcot at the end of January and unsold cattle are taken to Kalugumalai fair in Tinnevely. The third trip commences at the fair at Malayanur in South Arcot district in February or early March and unsold cattle are taken to the festivals at Kumbakonam or Tiruchendur. The fourth trip starts at the Panguni Utharam festival at either Mailam (South Arcot) or Palani (Madura district) and unsold animals from these two are taken to Chitrai festival at Madura, the unsold cattle drift

down to the several fairs in Tinnevely district finishing up at the Sankaranainarkoil Adi-Thapas festival. The fifth trip commences and ends with the Adi-Krithigai festival at Mailam in July. Besides attending these fairs, the Janappa Chettis also attend the annual fairs of North Salem and North-West Coimbatore to purchase forest bred calves which they take to the rearing tracts for sale.

The annual fairs of the Coimbatore district, viz., Avanashi, Karavalur, and Tiruppur are much more fairs for locally bred than imported cattle, though these latter are also fairly represented.

There are numerous weekly cattle markets in the south where trading is done on a smaller scale than at the annual fairs but in the same way there are regular trade routes. In the Coimbatore district Puliampatti is the starting market for the west of the district, Mysore and Alambadi cattle are brought down the Hasanur Ghaut. One trade route goes to Perundurai and the other through Annur to Tudiyalur and from there to Pollachi. Uppidamangalam is the centre for Dharapuram and Karur taluks, here the trade routes separate one going through Nainamalai (Namakkal taluk) and Turiyur to Ariyalur and the other going to Manapparai and Dindigul.

Palamaner is a cheap market; cattle from Mysore and Punganur are chiefly brought here by dealers and taken on to Gudiyattam and Ranipet. Cattle from Kangundy Zamindari, from Mysore and Tirupattur are also taken to Gudiyattam. Pullampet taluk of the Cuddapah district supplies local cattle, as well as a few of the Ongole type; some Ongoles also come from the Kalahasti Zamindari. At Ranipet the route divides, some animals going to Conjeeveram and Walajabad and others to the markets of South Arcot.

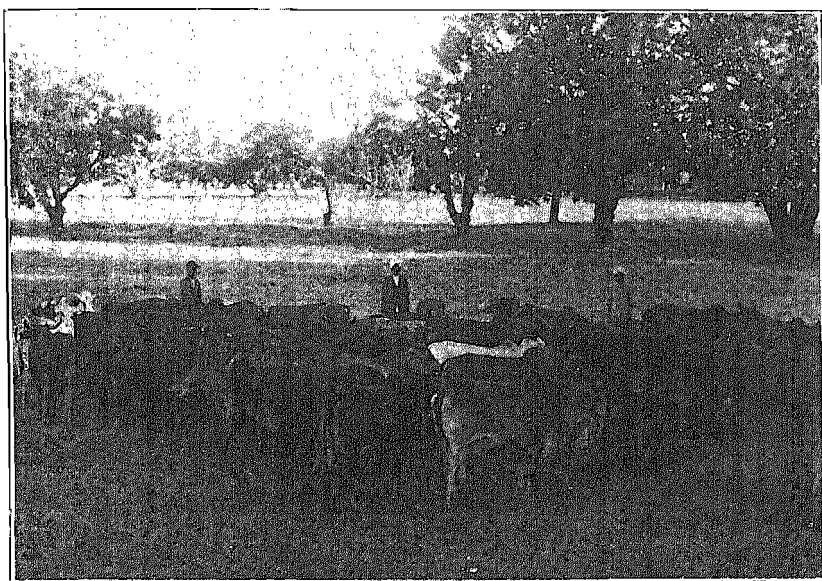
MADRAS DAIRY TRADE.

The number of registered cattle yards in the city in 1932 was 1,776 as against 686 in 1917. In 1917 there were 1,473 registered cows and 2,944 buffaloes, the number of registered animals has now increased to 3,639 cows and 4,068 she-buffaloes, as far as can be ascertained. In addition to these, a considerable number of both are kept in private hands. The great majority own only a few animals and the number is usually made up of cows or buffaloes or of a mixed herd of these. In addition are the calves, together in a few cases with one or two young stock. There is also a number of goats in the city, but few are kept by professional milkmen.

The main source of supply is from the cows and buffaloes kept within the city itself. Some milk arrives by rail consigned as such and there is the possibility of small quantities reaching the city by railway and bus passengers from the districts.

Adjoining villages contribute certain quantities, this is estimated at 400 Madras measures of buffalo milk per day (one Madras measure = 62·5 fluid ounces = ·39 gallon).

A milkmen's co-operative society handles about 400 Madras measures daily and supplies institutions such as the Mental Hospital and Child Welfare centres besides the public.



SCINDH HERD AT HOSUR.

Animals are housed in unhygienic stalls with bad floors, no bedding is used and the cows on getting up are covered with droppings and filth, generally on the hips, flanks and udders. There is a heavy animal smell in these places which is characteristic of overcrowding. Grazing area in Madras is very restricted and most of the animals spend the greater part of their time in the stalls which is bad from a health point of view for the cattle. Feeding troughs are very rarely cleaned out.

Wells are quite frequently found in the cattle-yards. In some cases they smell badly. Well water is frequently used for cleaning utensils and this is far from satisfactory. Drainage generally is poor.

I appreciate full well the great efforts that are necessary to obtain slight improvements, also the fact that the more inefficient and out of date people are in connexion with an industry, the greater the difficulty in getting them to see the necessity of any advancement. Thus I am able to sympathise with the various authorities in their attempt to solve this perplexing problem.

The Madras Corporation erected a large cattle-yard at Moolagothram near Basin Bridge and another at Chintadripet for the purpose of housing the milkmen's cattle at a nominal sum. At the former place there is accommodation for 480 cows and also 120 rooms for the use of the milkmen and at the latter there are stalls for 36 animals and 8 milkmen's rooms. All these are fully occupied at present.

Milk vessels are never properly washed and form a breeding ground for all sorts of germs. The milking is carried out in an unhygienic manner.

In general terms it may be stated it is almost impossible to gather by enquiry the true existing economical position of the dairymen in the City of Madras, they withhold information and true facts.

Some milkmen rear their own stock but the majority purchase cows in milk and sell them when dry. At present a fairly good young Ongole cow will cost about Rs. 90 to Rs. 120. The best heifer calves are sent to villages when 8-9 months old where the dairyman knows a number of ryots. The ryot rears the calf until she gives birth to her first calf—then the yield of the milk for the first lactation and the calf are allowed to him by the dairyman in lieu of rearing expenses. The ryot keeps the cow until the second calving, then she is returned to the owner. If the calf dies in the rearing, no claim is made by either party.

Dairymen consider that a first-class cow should give six calves and a second-class animal four. In addition to that, the first-class cows are better milkers and are retained for a longer period. About 60 per cent of the Ongole cows are considered to be first-class milkers while the majority of the crossbred cows are agreed to belong to a group above the first-class. Taking everything into account it seems that the total average calving of these groups is approximately 5 and that the duration of that period is about 6-7 years. When these cows are past breeding they have an average value of Rs. 30, some are sold to districts to produce manure and others to the butcher. Some poor milkers or breeders are given in part exchange for a better milker.

Most of the dairymen have to borrow money in order to carry on; very few, if any, are working on their own private capital. The most unfortunate class of dairymen are in the hands of money-lenders who exact an extortionate rate of interest. Carruth states an instance of this :—

Dairymen borrow Rs. 100. Only Rs. 50 is paid the dairymen in cash but the books show that Rs. 100 has been advanced. The dairymen repays the loan of Rs. 100 in such instalments as may be arranged with interest. He must always borrow from the same money-lender when an animal dies, etc., and has to be replaced. The money-lender tries to keep up the indebtedness of the dairymen as much as possible. There is thus a constant account until the dairymen's death. In another district it was stated that the money-lender paid Rs. 75 for every Rs. 100 borrowed, while the books showed that Rs. 100 had been advanced. The interest charged was Rs. 1-2-0 per month on the Rs. 100. The loan is repaid in instalments as arranged.

The principal concentrated foods used are gingelly cake, dholl husk and rice bran together with paddy straw. There is some system of adjusting the feeding of the animal to the natural fall of the yield of milk. The milkman is apt to overfeed his milch cow rather than underfeed it. It is found that an average Ongole cow yields about 2,450 lb. milk in a lactation of 9 months in Madras when fed on concentrate and dry fodder without grazing, this is approximately 9 lb. milk per day and the cost of food is 7 annas or a little less per day. During the dry period if the cow is maintained in the town it is given paddy straw and a little dholl husk and the cost of this is 3 annas per day. Milkmen generally feed the in-calf cows a little better for a month before calving and the cost per day is $4\frac{1}{2}$ annas. The cost of labour is difficult to arrive at seeing that the smaller dairymen, who form the largest class, do nearly all the work themselves. By making an allowance for the work done by the dairymen themselves and adding to that the wages paid, the labour is taken at Rs. 3 per month during milking periods and 8 annas per month for the dry periods. Labour costs are high on account of (a) the small herds, and (b) the taking of cows to private houses to be milked. In some cases wages are paid partly in meals and partly in cash. The rents of stalls vary very much but the average may be taken at about 8 annas per month or Rs. 6 per annum.

Milk recording was carried out at the General Hospital Dairy for 4 months in 1930. Forty-eight cows were recorded each month and they chiefly represented cows 5 months or less in milk. The daily yield for the crossbreds averaged 13.3 lb. and for Ongoles 12.3. The highest daily yield for (a) crossbred was 25 lb. and

(b) Ongole 21 lb. The Ongoles average 9 lb. milk per day and the crossbreds 12 lb. per day in a lactation of 270 days. Crossbred cattle represent about 30 per cent, therefore the average daily yield for all cows works out to 9.9 lb. or $2\frac{1}{2}$ Madras measures. The price of good milk varies from 7 to 8 annas per Madras measure. The value of a calf works out on the average at Rs. 5 each. The death-rate amongst calves appears to be 20 per cent.

Statement of account.—On the basis of one cow for a period of 6 years, which includes 5 calvings :—

Income			Expenditure,		
	RS.	A. P.		RS.	A. P.
Value of cow at the end of period.	30	0 0	Value of cow at beginning of period.	130	0 0
Interest on stock depreciation reserve fund.	15	10 0	Interest on capital ..	46	12 0
3,312½ Madras measures of milk at 7 annas per measure.	1,449	3 0	Death-rate during economic period.	30	0 0
Four calves at Rs. 5 ..	20	0 0	Barren cows	25	0 0
			Loss of produce during attacks of disease.	15	0 0
			Sickness charges ..	5	0 0
			Service fees	7	8 0
			Cost of feed	702	6 0
			Cost of labour	147	0 0
			Rent of stalls	36	0 0
			Plant charges	5	0 0
			General contingencies ..	30	0 0
			Profit	275	3 0
	1,514	13 0		1,514	13 0

This is approximately a profit of Rs. 55 per lactation period.

Buffaloes.—A 6-year basis for five calvings is adopted. The great majority of buffaloes are purchased either at the first or second calving, the average price being about Rs. 65 each. They are sold at the end of the period for Rs. 20 each. Buffaloes are affected by climatic conditions, a cold wind will temporarily reduce the milk-yield, they also suffer from the heat in the day if not protected. On the average, buffaloes are not so well cared for as cows. The death-rate of calves and those of average economic value is about 70 per cent. The average cost of feeding a buffalo in milk is about Re. 0.5–8 per day and in the dry period 2 annas per day. They are usually milked in the yards and cost of labour is less than that in the case of cows. On the average the daily yield of milk of a buffalo in Madras can be taken at $1\frac{1}{2}$ Madras measures (6 lb.). Buffalo's milk is a little cheaper than cow's milk.

The statement of accounts on the basis of the buffalo for the whole period of six years is—

<i>Income.</i>			<i>Expenditure.</i>		
	RS.	A. P.		RS.	A. P.
Value of buffalo at end of period.	20	0 0	Value of buffalo at beginning of period.	65	0 0
Interest on stock depreciation reserve fund.	6	15 0	Interest on capital ..	25	2 0
2,250 Madras measures of milk at 6 annas.	843	12 0	Death-rate	15	0 0
Total value of calves ..	6	0 0	Barren buffaloes	12	8 0
			Loss of produce during attacks of diseases.	10	0 0
			Sickness charges	3	0 0
			Service or crossing fees ..	5	0 0
			Cost of foods	622	11 0
			Cost of labour	52	0 0
			Rent of stalls	36	0 0
			Plant charges	5	0 0
			General contingencies ..	20	0 0
			Profit	5	6 0
	876	11 0		876	11 0

This works out to a profit of about Re. 1 per lactation period.

Averages—Cows.—In working out the above statements “average” should be interpreted with reference to the following points: That the number of cows which represent (a) average (b) average plus and (c) average minus are all combined in that figure. The relation between the numbers and yield of (b) and (c) could not be ascertained exactly but it appeared to be 3 to 2 respectively, while cattle on or near the average line make up about 50 per cent.

Taking these figures 100 cows contain the following groups:—

50 average,

30 average plus,

20 average minus.

It follows then that about 80 per cent of the cows are economic. The minus figure before a cow becomes uneconomic is approximately Rs. 13-8-0 per period. This represents in milk about 144 lb. or 36 Madras measures, therefore a cow yielding less than 2,500 lb. per lactation is not profitable.

Averages—Buffaloes.—If a few Delhi buffaloes are excluded, there does not appear to be so much variation amongst buffaloes as cows. At the same time it will be seen that the remarks under cows apply to some extent. It may be observed, however, that the majority of the animals would be classed along or near to the average line. Then there are the average plus and minus groups but the latter appears to include a smaller percentage than in the case of cows.

General.—The smaller dairymen, who form the largest class, do nearly all the work themselves. Thus the actual money paid under this head (labour) is always small. Under the circumstances the large portion of the wages earned may be looked on as part of the living. While that is so, it must be clearly understood that the wages are actual part of the cost of production, because if the dairyman did not work for himself, he could earn wages in other ways. There is no doubt that the standard of living amongst the dairymen is on a pretty low scale.

There are in the city a fair number of economic cows and a certain number of buffaloes. Very few dairymen keep cows only. In 1932 it was ascertained that the herds of registered dairymen in the city were classified as follows :—

	PER CENT.				
Cows only	22.10
Buffaloes only	22.42
Cows and buffaloes	55.48

The droppings of the animals are generally exchanged for kanji water, i.e., the washings from rice, etc., and other household foods. It is collected from door to door in a barrel for the purpose. It is generally fed to buffaloes. In some instances a part of the droppings is sold in wet condition at the rate of one cart per rupee. This has not been taken into account.

The dried cow-dung (bratties) is sold for fuel, the price depending on the value of firewood, the weather (dearer in wet weather) and the quality of the bratties. These are prepared by the dairymen or by the dealers in kanji water. The average annual sum realized in cash by the sale of manure is too small to be worth taking into account.

Quality of milk.—Samples of milk examined at the General Hospital showed an average fat percentage of 3.65. In the case of cows milked from door to door it was noted that the milkmen drew a quantity from each teat when serving customers. It is well known that the first drawn milk is not so rich in butter fat as the last milk, but to demonstrate the point, a typical case is recorded.

An Ongole cow about 6 months calved supplied three customers in the morning, and two in the evening, and was milked in the presence of each purchaser. A sample was taken from each milking as supplied to the various customers. The dairyman was not aware of the purpose for which the samples were taken, hence he followed his usual practices as regards milking, etc.

Customer.	Distance travelled from cow-shed or from last customer.	Particulars of milking.	Quantity sold—Madras measure.	Percentage of fat.
<i>Morning milk.</i>				
1	1½ furlongs	.. First drawn ..	½	1.8
2	2 do.	.. Second drawn ..	¾	4.9
3	½ furlong	.. Third and last ..	¼	9.0
Average ..				4.55
<i>Evening milk.</i>				
4	1½ furlongs	.. First drawn ..	¾	4.1
5	2 do.	.. Second and last ..	½	8.8
Average ..				5.98

Note.—In this instance the distance travelled is considered small. Some cows have very long journeys and are shod.

The calf was allowed to suck until the milk dropped before each milking. That adds to the difficulty in obtaining accurate results because the first samples, for example, will vary considerably with the quantity of milk taken by the calf, being richer if comparatively large, and poorer if small.

Many customers who have the cows milked in presence complain of the quality, and undoubtedly, as regards quality No. 1 customer gets very bad milk, but the fault is not with the dairyman nor cow, but with the practice followed.

Again complaints of children being upset by milk are common, and there is no doubt that the last drawn milk would have that effect. Even when milk is specially treated for infants, the food varies with the first or second milk, etc., and there is no uniformity. It is quite possible that a child may have No. 1 sample in the morning and No. 5 in the evening, thus a poor diet followed by an excessively rich one cannot but have injurious results.

To get over the difficulty, suppose that a cow supplied four parties, then one teat only should be milked for each, if two, two teats, if three, milk one teat quite dry, then draw the remainder from another. This suggestion is not free from objections; it is much better than present practices.

Samples from retailers in the bazaar who were selling milk as pure contained a percentage of fat varying from 1.5 to 3.6 per cent.

Although buffalo milk is rich in fat and an average sample would contain at least 6 per cent, it was found that the fat percentage varied from 2.1 to 4.5 per cent thus showing that adulteration takes place.

Methods of adulteration.—The butter fat in milk may be reduced in several ways—

- (a) by adding water,
- (b) abstracting cream,
- (c) by adding skim milk, and
- (d) by various combinations of these.

A large number of dairymen state that adulteration is resorted to in order to be able to make a living and that it is not possible to get a paying return for pure milk, because consumers must have a large quantity at a small price.

The amount of adulteration varies with the kind of consumer. For example, they say that if too much water is added, respectable people will not buy. Cow's milk is adulterated either with water or by the addition of adulterated buffalo milk. Dairymen look on milking the cow in the presence of the purchaser as a certain amount of injustice and no doubt this lessens his profit. Some purchasers state that it frequently happens that even when the cow is milked in presence that the milk is adulterated with water. The adulteration is a distinct gain and varies very considerably in different divisions.

Regarding buffalo milk, in some cases the milk after milking is put into vessels which have previously been well heated, the object being to keep the milk sweet and allow part of the cream to come out to the surface. After 7 hours the cream is skimmed off along with some of the milk. This is boiled, converted into curds, then churned for butter, with buttermilk as a by-product. The idea underlying these operations is to obtain ghee and skim milk in a sweet state which after adulteration with water may be passed as cows' milk. Tea and coffee hotels are increasing rapidly in the city and consequently more milk is consumed by the population. Several of these hotel owners and the general public are fairly good judges of milk and these get rather a better quality than is sold in the bazaars.

Some of the hotel owners have a lactometer for testing and if the reading is considered unsatisfactory, the milk is rejected or price reduced.

It is difficult to estimate the gain by adulteration at present but Carruth estimated it in 1917 for cow's milk at not less than Rs. 75 per cow on the average over the 5 lactation periods and for buffalo milk at not less than Rs. 250 per buffalo over the five lactation periods.

Quantity of milk produced in the city.—This is difficult to arrive at as there are a large number of private owners who keep a cow for thier own use, these cows are not registered. Of the total

number of registered cows, one quarter is estimated as dry on the yearly average, the estimated yield is 6,825 Madras measures per day. One-sixth of the buffaloes are estimated as dry and the daily yield of buffalo milk is 5,085 Madras measures. In addition to this, about 600 Madras measures are brought into the city from adjoining villages, there is also a large dairy at the Fort St. George where 70 cows and buffaloes are maintained, the contractor supplies about 62 Madras measures of milk and 40 lb. butter daily to the garrison. The total estimated amount of milk from the registered cows and buffaloes in the city plus 600 Madras measures from the villages is approximately 12,500 Madras measures per day.



DIMINUTIVE TROTTING BULLOCK,
30 inches high.

Breeding.—No proper system is followed. The crossbred cows in Madras are the result of crosses with bulls from Great Britain and Australia many years ago. These bulls did not survive for any length of time, diseases such as rinderpest, foot and mouth disease, etc., took their toll. The influence of these imported bulls on the cow in the city has been considerable. The dairymen highly value his crossbred cows. The great care with which the heifer calves are reared when compared with those from native breeds

shows without doubt how much such animals are in favour. Few dairymen are inclined to part with this class of stock although they realize that they are not so hardy as the native cattle and require more care and better feeding in the rearing, etc. Heifer calves from good milkers of Ongole breed are well reared and are kept for the herd, the remainder are sold as soon as the cow goes dry. A number of dairymen send their dry cows to the Ongole district to be kept until the next calving and they pay Rs. 5 to Rs. 6 per month for their keep. None of the dairymen send their crossbred cows to the country until the next calving, there is a general fear to trust these in the hands of strangers. Most of the dry she-buffaloes are sent to the country until next calving, only a few are kept in the city. The charges for keep in the country for buffaloes varies very much from 12 annas per month to Rs. 4 per month. Most dairymen prefer to pay well so that their buffaloes are well looked after and fed.

MILCH-CATTLE AND DAIRYING.

There are really no good milking breeds of cattle in the Madras Presidency, for the simple reason that in the country districts, among the agricultural population, milk as such is seldom used as an article of diet. It is among the upper and middle classes and chiefly in towns that there is demand for milk, and such people, although they own cows, often feed them very well, have little interest in the calves of these. They require the milk for their own use, and the calf is simply kept to be with the cow to start the flow of milk and its only sustenance are the stripings after the cow has been milked. Thus the bulk of the young stock born to milch cattle either die young or are weak and stunted, and fresh and heavy demands are continuously being made on the country to supply this wastage. Little effort is made to raise up a milking breed. Of recent years this demand has been greatly on the increase as the standard of living has risen. This is chiefly due to the habit of drinking coffee and tea, which has developed very rapidly, especially in the West Coast, and in the wetland tracts of the south. The tea shop on the West Coast can be seen on any roadside; they are to be found everywhere and in consequence of it, demand for milk is now very great. In the Tanjore delta there is hardly a village where coffee cannot be obtained. Even among the coolie class of the Tanjore delta a certain number now have to have their coffee every morning, especially returned emigrants from the Straits. The coffee clubs of the larger towns of the southern districts are well known, where the men can have their cup of coffee without incurring extra expenditure in the household.

There is probably more wastage of good cattle from this constantly increasing strain on the pick of the village cows, which are absorbed by the town than from any other source, and already two breeds of cattle have practically disappeared, viz., the Tiruchengodu cows of the Salem district and the Punganur cows of the Chittoor district; though, as before mentioned, the loss of this latter breed is due partly to the crossing with Mysore bulls. The Ongole is the best milking breed, which now exists, though the average milk yields even from these are nothing remarkable, although if systematic breeding was carried on, the milk yield could be improved as is seen from the results at the Chintaladevi Livestock Research Station, particulars of which are found under the Ongole breed. The average yield in Madras City for Ongoles is about 2,300 to 2,500 lb. in a lactation of 250 to 290 days the daily average being 8 to 9 lb. per cow. Some good milkers of this breed have been seen occasionally in Madras. The export of cows from this breeding tract to Madras City is somewhere about 2,500 in a year. It is estimated that about 1,500 Ongole cows are slaughtered annually in Madras City. There is hardly a town in the Presidency except possibly on the West Coast, where Ongole cows are not to be seen. A lot of these animals are usually kept in a poor condition. They are big animals and take a lot of feeding, as they feel the change from the forced feeding of the breeding tract to the communal grazing grounds, on which they can find little or nothing to eat, and on to which they are turned out after their morning feed.

In large towns, the demand for crossbred cows is great, especially in Madras. These animals calve more regularly, yield more milk, have a shorter dry period and generally milk without their calves. Dairymen are prepared to pay up to Rs. 300 for a good young crossbred cow. The only places where any real effort is made to meet this demand for milch cows is in Ongole district and in the extreme south. The women of the 'Mala' caste in Tungtoor district of the Ongole taluk who are both weavers and field labourers and the Nadar women around Virudunagar, Sattur and Aruppukottai of the Ramnad district who have to meet their household expenses by pounding dhol or redgram, have made the rearing of cows a special industry. They rear heifer calves which are brought up by them all through the south as far north as Dindigul. These are fed on grass, fodder cholam and as concentrated food are given the husks of redgram. These people will not part with very good cows as they wish to keep the strain, though apparently no effort is made to have them served by a bull of good milking strain. The cows reared by these Nadars supply the whole of Tinnevely-Palancottah demand, as well as a considerable proportion of that of Tuticorin, Travancore and Madurai.

Trichinopoly and Coimbatore are dependent on supplies from villages in their respective neighbourhoods. In Salem some very fair cows are still to be seen and are probably the descendants of the old Tiruchengodu breed. On the West Coast where the demand for milk is always greater than the supply, there is a small effort to meet this. A few bulls and cows of the Guzarat and Scind breeds are to be found in the towns on the West Coast, these have been shipped down from Bombay by merchants and others. A considerable number of heifer calves are annually imported for rearing and some very fair cows are to be found in the Palghat taluk.

When milk is used at all by the ordinary classes it is usually in the form of curds and buttermilk and for the production of this and ghee, she-buffaloes are usually kept. Such milking buffaloes are very ordinary animals and seldom give more than 3 to 4 seers of milk a day. Those of Guntur, Kurnool, Cuddapah, Coimbatore and South-east Salem have the reputation of being of better quality but it is seldom that any of these animals give a higher yield than this. For the past 15 years Delhi buffalo bulls have been stationed at the Coimbatore Agricultural College with the result that in the surrounding villages good graded she-buffaloes are to be seen, these animals yield more milk than the ordinary country buffaloes. Villagers bring their cows for service to the college from villages a distance of 10 miles away. The same applies to some of the villages surrounding the Buffalo Breeding Station at Guntur.

In the black soil tracts of the Ceded districts every household keeps buffaloes and curds and buttermilk enter largely into the diet of these people, who live on dry grains while the ghee is a considerable source of income. In parts of Coimbatore district, stud buffalo bulls are occasionally kept.

Considerable numbers of she-buffaloes are annually exported from Cuddapah, Guntur, Salem and Coimbatore districts. Those from the former two districts chiefly go to Madras. A certain number also come from Salem but this district supplies more to Trichinopoly and Tanjore towns. The Coimbatore supply goes to the West Coast.

The Agricultural Department of Madras are building up a herd of Scind cows, the aim being to produce a herd of very good milkers for urban and town milk supply. This breed of cow is small in size and is easily maintained. It thrives well even under poor conditions. The particulars of this breed are given elsewhere in this book.

Dairying.—From a consumer's point of view, the custom of taking the cow from house to house and milking out the required quantity at each stopping place is not to be recommended unless

the customer takes all the milk from the cow. Under the joint family system of living, people of the middle and upper classes, who require milk for their every-day use, usually keep their own cow, or make arrangements with villagers for the hire or loan of a cow, while it is in milk. This is really the most economical method for joint households, and the cost of the animal's keep is hardly felt, since most of the concentrated food is made available in the process of preparing food in the house, such as ricebran, rice water and plantain leaves, with the remnants of the household meals and the addition of a little poonac.

It is difficult to see how any improvement is to be expected so long as no milking breed is allowed to survive. In several of the large towns one finds dairies, but these are mainly for the supply of butter for the several communities and it is only where the cream separator is used and where it is possible to dispose of the separated milk at remunerative rates that this trade can survive. In towns, however, there is usually a market for separated milk for the manufacture of curds and the supply to the coffee clubs. At these dairies, also, buffaloes' milk is largely used, since this, being so rich in butter fat, yields more cream and consequently more butter (also finer in texture) than cows' milk. For the same reason she-buffaloes are kept in country districts for the manufacture of ghee and also for the reason that buffaloes are considered not such expensive animals to feed.

The ghee industry has altered very much within recent years, since rapid means of transit have been developed. Formerly the demand was much more of a local one and was more or less limited; thus there was a competition in the supply and the ghee was good. Now the whole of India, as well as Burma, forms the market, with the consequence that every corner of the country is now exploited by merchants for the supply of ghee. The result is that, at every change of hand from the producer to the consumer the ghee is liable to be adulterated. Even if the producer does not adulterate the ghee, usually not much care is taken in its preparation. Moisture is often left in it, which when the ghee is kept gives it a bad smell. In the Ceded districts Kusuma or safflower oil is largely used for adulterating ghee. In some cases this is done even by the ryot before it is sold to the petty dealer. The petty dealer, it is usually stated, makes six tins (kerosene tins) out of four of the ghee which he collects. This is done by adding safflower or groundnut oil or animal fat. As the demand for milk increases, ghee is bound to be more and more adulterated. Ghee usually sells at Rs. 2-8-0 to Rs. 3 per viss (3 lb. 2 oz.), if it is pure ghee, this entails a loss to the producer. People complain of the high price of ghee but there is no reason for this. For example 100 lb. cows' milk at $1\frac{1}{2}$ annas per lb. if sold as fresh milk is worth

Rs. 9-6-0, if converted into butter, it will make approximately 5 lb. and this at Re. 1 per lb. is worth Rs. 5 besides separated milk at 4 pies per lb. Rs. 2; when converted into ghee it yields about 4 lb. and this realizes Rs. 3-12-0. In the case of buffalo milk, about 6½ lb. butter is obtained, i.e., Rs. 6-8-0 plus Rs. 2 for separated milk, this would produce about 5½ lb. ghee valued about Rs. 5.

In the ghee producing districts, good ghee can still be obtained in large quantities, but under existing trade conditions, this is seldom allowed to reach the large markets, nor is this surprising, since the price of good ghee and bad ghee is very much the same. The adulteration of ghee may, however, be taken as essential if the supply is to meet the demand and it would be much better, if everyone concerned realized this; for then, it would be possible for co-operative societies and other similar bodies to provide a ghee-mixture, consisting of pure ghee and vegetable oils, instead of the present haphazard methods and adulteration. In the West, groundnut oil is used in the manufacture of Margarine and this is used considerably for cooking, etc. There is no reason why a good ghee-mixture could not be made in India from pure ghee and groundnut oil. The Food Adulteration Prevention Act is in force in several places in the Madras Presidency and it is to be seen if this will prevent the adulteration mentioned above. In some recent prosecutions it has been stated that ghee was adulterated 70 per cent by some merchants.

During the last 15 years small creameries have opened up around Coimbatore, contractors purchase milk, separate it and sell the cream for butter-making chiefly in the Nilgiris. Separated milk is sold to coffee hotels, etc. The people have taken to coffee and tea drinking in the last decade and this opens up a market for separated milk.

Most of the milch animals are maintained in the towns by contractors and petty milkmen, there are no dairy farms on the outskirts of these towns. In the interests of cattle-breeding and dairying it is very desirable that the animals should be kept outside these congested areas where they can be housed under better conditions and obtain a little grazing and exercise daily.

PROFITS FROM STOCK-BREEDING.

It is impossible to form any but a very rough estimate of profits from stock-breeding, since so much of the food and time, given to the animals, has very little sale value; besides which, the conditions under which breeding and rearing are carried on, vary so much in different parts.

The Nellore breeder, who depends on his grazing lands and harvested wet lands for the greater part of the year as food for his herd, sells his male stock when a year to 18 months old at 2 for Rs. 100. Allowing that 50 per cent of his cows calve each year and that half his young stock are bull-calves, a herd of 100 cows will bring in a gross revenue of Rs. 1,250 from the sale of young bulls alone. Besides this, he adds to his female stock 25 per cent every year. Allowing for an annual loss of 10 per cent in his breeding herd, he still has a 15 per cent increase, which, even if valued at 5 for Rs. 100, would bring him in Rs. 300, i.e., in all Rs. 1,550 or Rs. 15-8-0 for each cow. To maintain his herd, he must have considerable grazing areas, but, even allowing 6 acres per head for each cow with its progeny, this would probably not cost him more than Rs. 500 per annum, i.e., allowing for assessment and interest on capital value of the land. This leaves Rs. 1,050 to pay for his cattle herds and to provide straw for the months when grazing is scarce. This straw he obtains from his own wet lands, and against its value can be set that of the manure produced when the herd is kept in wet lands. Allowing Rs. 10 a month for the pay and meals of the cattle herds and a 10 per cent loss from deaths among his stock, this still leaves a net annual income of over Rs. 725 or more than Rs. 7-4-0 per head for each cow.

The forest breeder of Kollegal and North West Salem keeps his cattle penned in the reserved forests, except at the harvest time, and pays 8 annas per head for the year's grazing; in the North Salem a penning fee of Re. 1-4-0 per 100 head of cattle is charged in addition, no penning fee is charged in Kollegal area. His cattle are subject to great variations both in climate and in the supply of food and water and do not therefore breed so regularly as better-fed 'plains' cattle. It may be reckoned therefore that the herd does not drop more than 40 calves per annum to every 100 cows. Thus 100 cows on the same basis will give 20 bull calves which sell when 9 months to a year old at about 5 for Rs. 100 (a year or two ago bull-calves in Salem district realized Rs. 25 to Rs. 35 each at 9 to 12 months old). The number of male calves will probably exceed the number of female calves, owing to the poor condition of the cows in the hot weather—in fact breeders say they do—but this need not be considered here. Thus 20 bull-calves in a good season should bring in a gross revenue of Rs. 400. The value of the female calves need not be considered, since these will just about maintain the strength of the herd, when allowance is made for deaths from disease, starvation, wild-beasts and old age. Out of his revenue he has to meet grazing fees and the cost of his herdsmen, the latter being, usually the cost of their food and clothing. This should not amount to more than Rs. 100 in all. Deducting 10 per cent of the gross revenue for mortality among his male

calves this leaves a net annual income of Rs. 260 for every 100 cows or about Rs. 2-10-0 per head of his breeding herd.

In Kollegal the mortality amongst young stock is estimated at 10 to 15 per cent and in Dharmapuri area at 5 per cent, so 10 per cent is taken as the average.

The Kangayam breeder is fortunate in having a class of animal which is so popular; and the profits of cattle breeding and rearing—for the two go hand in hand here—are much greater than in either of the preceding cases. Much greater value is placed here on the 'life' of a young animal, i.e., its value from parentage and breeding. Cows also usually calve, in this tract, every 15 to 18 months, since, whether in milk or in calf, they receive proper treatment throughout. If a cow calves every 15 months, her progeny when 4 years old will have an average value of Rs. 112-8-0, i.e., Rs. 175 per head for bullocks, and Rs. 50, for heifers and this, excluding the value of the manure produced, can be taken as the gross annual revenue. Against this, there is the following expenditure for 4 years.

	RS.	A.	P.
(Grazing for six months in the year at 2 acres per head (2½ acres for a full grown animal): two acres of grazing land at Rs. 1-5-0 per acre (13 annas assessment and 8 annas for attendance and interest on the capital value of the land) for 4 years.	10	8	0
Straw, gruel and attendance for the remaining six months at Rs. 3-8-0 per mensem for 4 years	84	0	0
Depreciation in value of the cow and death of young stock at 10 per cent of the gross income	11	0	0
Total	105	8	0

The above leaves a net profit of Rs. 7 per annum on the progeny of a single cow. The manure from these animals, which is required for garden cultivation, has also a very considerable value: for on it, the ryot has to depend for his heavy crop yields, which are essential, if garden cultivation is to pay.

In the Ongole tract it is impossible to form any estimate of the profits of cattle-breeding, since so much of the cost of feeding is dependent on spare time employed in collecting fodder and grass, with which the young stock are stall-fed; but the profits must be considerable, since even female stock, which for their age, are much less valuable than the male stock, are very largely reared, and quite good animals, which have been reared most carefully, can be purchased for Rs. 70 to Rs. 90 when from 3 to 4 years old.

THE MEAT TRADE AND SLAUGHTER OF LIVESTOCK FOR FOOD.

Cattle and buffaloes.—Although the bulk of the population are mainly vegetarian, a large proportion of them are only so from necessity and have no religious objections to eating flesh of one sort or another.

The hill tribes of the northern districts eat large quantities of beef, which is evidenced by the large quantities of green bones brought to the shandies of Vizagapatam district. Muhammadans throughout the Presidency have no objection to eating beef and in many places cattle are regularly slaughtered by them for food. A fair amount of beef is eaten by the people in large towns and cantonments.

As would be expected in a country, while cattle are the sole power and, where there are, among the bulk of the population, strong religious objections against slaughter of cattle, the beef trade depends very largely on animals which are, or have become useless for draught or breeding; and if the question is regarded without bias, it is clear that this is an excellent thing for the cattle of the country. By the removal of all useless and worn out cattle, a serious menace to outbreaks of cattle diseases is removed; for, if such animals are not destroyed, they are usually allowed to slowly starve to death and in their weak condition, are very much more prone to contract contagious diseases. Not only this, but the removal of such animals leaves more room and more grazing for useful animals. In the Tinnevely district, since the export trade in beef cattle from Tuticorin has developed, a great improvement is now noticeable among the village cattle. Useless worn out and half starved cattle are now seldom seen, as ryots dispose of animals, which are no longer useful, to the export trader. The Colombo beef trade removes large numbers of useless cattle and there is also a certain amount of trade in beef to the Malay States. This is chiefly dried beef, which is prepared in some of the tanneries of the North Arcot and Chingleput districts. There is hardly a weekly market in the Presidency where cattle are not brought in for sale to butchers, though in many cases their slaughter must be mainly for the sake of the skin and bones, since animals are little else.

Sheep and goats.—It may be said that all the surplus livestock of this class are slaughtered for meat. At festival times throughout the country goats are killed in very large numbers, but, apart from this, the supply of green skins, which are regularly brought for sale to the cattle markets, shows to what an extent goats, and in some measure sheep are slaughtered for food. Fattening sheep and goats for the butcher is not general and it is mainly for the export

trade to Colombo that these are fattened, though to a certain extent, also for the Bangalore, Madras and Nilgiri markets. Hindupur is perhaps one of the most important mutton markets in the Presidency and some splendid goat wethers are brought here by dealers from the Ceded districts and the Hyderabad State. In all the southern weekly markets fat sheep and goat wethers are brought, singly or in pairs, for sale by petty ryots and coolies. These are chiefly bought up for the Colombo market and fetch very good prices.

BREEDING BULLS—CARE AND MANAGEMENT OF.

Selection.—A breeding bull should be selected with due consideration, as its influence on the progeny is extensive and it becomes the sire of many animals. For this reason a bull is said to be 'half the herd.' It should belong to a pedigree of good milk or draught strain. A good dairy cow is expected to produce a fine calf, either male or female. Good yield of milk is a hereditary quality and can be increased by proper methods of breeding. Since it is believed that this quality is transmitted by the male, it is incumbent that good dairy bulls should be maintained to improve the stock. A breeder intending to purchase a bull for stud purposes must satisfy himself with the heredity of the animal before he looks to the external points. The animals to be bred may be required for draught purposes. Therefore a bull should be chosen which possesses good points as regards pulling powers, that has well-developed shoulders with plenty of muscle, big girth measurement, straight clean limbs, good loins and hind quarters and fairly level back. Attention should be paid to the feet of the animal. A small, compact and hard foot, free from cracks is desired. Large soft feet are not desirable.

Care and treatment.—Considering that a bull is half the herd it should be well-treated and given more attention than the ordinary animals of the farm, that is, if it is to produce strong, healthy and well-developed calves and to give a good return for the money invested on it.

When a bull is taken to its new home, it generally refuses to eat much at first and it should not be permitted to cover cows for a week or two until it has become accustomed to its new surroundings and is eating well. A bull requires gentle handling and should not be ill-used.

Exercise is essential, otherwise the bull becomes slow and sluggish and shows no inclination to serve. It should be walked on a good hard road for about an hour in the morning and one hour in the evening or it can be worked in a single bullock cart for half a

day. Pay attention to the bull's feet, if it is not exercised enough, the hoofs grow long and turn inwards and the animal cannot walk properly. If this should happen, call in the local farrier and have the hoofs pared with a sharp knife. The bull should be regularly groomed each day in order to keep the skin in good condition and free from ticks, lice, etc. Washing with soap and water occasionally is also beneficial.

If vermin appear, wash the bull 2 or 3 times with a solution of disinfectant such as cresol; give an interval of a week between each washing. The first washing should kill the active vermin but not their eggs; the second washing will destroy the vermin which hatch out of the eggs.

If a bull becomes vicious put it in a small enclosure or yard and let it run with a dry cow for company, this often has a good effect.

Housing.—One of the first points in the successful management of a bull is to provide it with proper shelter from the heat in the day time and from the rains and cold in the monsoon; a shed about 10 feet by 10 feet, well lighted and ventilated and free from draughts. A feed trough should be fitted. The best floor is concrete with diamond shaped patterns on it to prevent slipping or Cuddapah slabs chipped in the same manner; these are easily washed and kept clean. A good gravel floor is satisfactory but it cannot be washed and requires new gravel every fortnight or so. A little bedding of straw or old hay is advisable and this makes good manure afterwards.

Feeding.—The bull should be kept in good condition if the maximum value from it is to be obtained, therefore it should be fed regularly and well. Suitable rations are as follows:—

				Large bulls (Ongoles) In full work.	Medium sized bulls (Kangyam and Sind) In full work.
Groundnut cake	..	..	..	1½ lb.	1½ lb.
Horsegram	..	..	..	1½ "	1½ "
Cotton seed or dholi husk	..	..	..	1½ "	1 "
Rice bran	..	..	..	1½ "	1½ "
Salt	..	..	..	2 oz.	2 oz.
Mineral mixture	..	..	..	1 "	1 "
Fodder or hay	..	..	..	15 lb.	15 lb.

Green grass if available, should be given and the supply of dry fodder reduced. Cholam or sajja grain may be substituted in place of cotton seed. If the bull is not performing plenty of services or is putting on flesh, reduce the ration slightly. The rations given above are only a guide and will not be suitable for every bull. The

feeds should be varied a little from time to time if the bull does not relish its food. Half the concentrated food should be fed in the morning and half in the evening. A suitable time table is as follows :—

6-30 a.m.—Clean out stall.

7 to 7-45 a.m.—Exercise bull.

7-45 a.m.—Water.

8 a.m.—Feed half the concentrated ration.

9 a.m.—Groom and clean bull.

11 a.m.—About 5 lb. of dry fodder or 12 lb. green grass if available.

5 to 5-45 p.m.—Exercise.

5-45 p.m.—Water.

6 p.m.—Feed half concentrated ration.

6-30 p.m.—Remainder of dry fodder or green fodder to be fed.

The cake should be soaked in water for 12 hours before feeding and horsegram should be boiled. A little jaggery can be mixed in the food two or three times a week.

Strict regularity in feeding both as regards quantity and time is one of the great secrets in the management of cattle.

Service of cows.—It is not advisable to run the bull with the cows. If this is done, the bull serves the cow repeatedly until both the cow and the bull are exhausted with the result that the cow may not prove in calf and the bull becomes unfruitful at an early age. One service is sufficient if the cow is in proper season. Double service exhausts the bull to no purpose, endangers its fruitfulness, reduces its condition and constitution, diminishes the number of individual cows it can serve in one season and consequently the good it can do in the district. A young well grown bull aged $2\frac{1}{2}$ to 3 years should not be allowed to serve too many cows in its first year, otherwise he will become stunted and lose vigour. Forty to 50 services are quite ample. An adult bull $3\frac{1}{2}$ to 4 years old and well grown will perform 60 to 80 services a year. Some bulls perform over a hundred per year but this is not recommended. A good bull is active from the age of $2\frac{1}{2}$ to about 8 years.

The various causes why bulls refuse to serve at times.

1. Slowness of service is not necessarily an indication of infertility. It is true, however, that they are often associated and notably so in animals which are too fat or alternatively, in those which are going back in condition.

2. The best condition for breeding in males is a hard one produced by sufficient exercise to work off a surplus of fat, but favouring the retention of nitrogenous substances and vitamins. However, it cannot be sufficiently stressed that with a male as well as with the female, a rising condition is always more conducive to the proper discharge of the reproductive functions than a falling one.

3. Slowness in service is sometimes psychical in nature, due to strange surroundings or to the nature of the control to which the animal is subjected. Hesitation in service is also sometimes the result of sores or warts on the prepuce, penis or feet and males are in best condition for service a few hours after they have been fed, when they are more active than directly after a meal.

4. It is sometimes noticed that stud animals which have travelled long distances and are introduced into fresh surroundings are temporarily infertile, especially when the new conditions are less favourable than those to which the animals have been accustomed. This, however, is usually only a temporary result and full fertility can generally be restored by favourable treatment in the way of diet and surroundings.

5. It is of great importance that a male animal should be used regularly. It should not be used too much at one time and too little at another.

6. It should be remembered also that prolonged periods of disuse may be as injurious as over use since an undue accumulation of semen in the generative passages may result in back pressure and deleteriously affect the spermatogenetic capacity of the testes and possibly also interfere with the functional activity of the accessory sexual glands.

7. With any young males it is inadvisable to allow service to occur too often, even though the service may be fertile, as frequent service, when performed too early, is likely to result in the undergrowth of the sire and to impair its breeding capacity in later life. Young males are most liable to suffer from underfeeding and overuse, whereas old males suffer from overfeeding and underuse.

8. In general, the males of the lighter breeds are able to serve more females successfully than those of the heavier breeds.

9. The age to which a male can be kept for breeding will depend on the regularity with which his services have been distributed throughout the year, the provision of regular and continuous exercise and the prevention of too great fat accumulation. The method of handling and the temper of the animal are also important. Bulls can be kept active and docile to old age by being run in a small paddock and shed with a dry cow for company. Various contrivances to support the weight of a heavy male when serving young females are also often used.

10. Onanism or sexual abuse is sometimes a source of trouble more especially in young animals that are given little service.

11. It is easy to see how a heat period in a cow might very easily be missed. There are often no apparent preliminary symptoms of approaching heat, such as are observable in the sow and particularly in the bitch, which bleeds extensively for several days (pre-oestrus). External hæmorrhage in the cow or heifer, if it occurs at all does so two or three days after the beginning of the heat. This is far more common in heifers than cows; in the latter it is rare, but in heifers the appearance of blood-stained mucus at the vulva is quite frequent; it forms a useful indication as to when the animal may *be again on heat*. On the average, heat lasts about 16 hours in heifers and 19 hours in cows. In the cold season a heat period may only last six hours as against 16 or more hours in summer. It is easy to see therefore, that a period occurring in the night is overlooked. Again it is more difficult to detect the heat when the cow is tied in the stall than when she is allowed to run about; for then, the cow's restlessness is more easily discernible and she is seen to jump or be jumped by others, a sure sign of oestrus.

12. Several years ago, I went into the question of fruitless services in Madras and found that the cause of this was that cows were brought to service when they were not in heat and that the bulls forcibly served them after being tied up. I stopped this method and erected a small service yard and the bull was allowed in with the cow. If the cow did not stand for service it was sent away. After this, there have been no complaints. Therefore I am inclined to think that several of the cows which had to be taken back were not properly in heat.

BREEDING AND REARING OF DAIRY CATTLE AND BUFFALOES.

It is impossible to exaggerate the importance of a pure milk supply in any country; it is especially so in a country like India. As an agricultural country, India's demand for fine draught animals is equally great. Good cattle, both male and female stock, are therefore a dire necessity. Yet, the present condition of livestock is nothing but deplorable. Let it not be, however, supposed that there is any shortage of cattle. In fact India is grievously overstocked with cattle which the country cannot properly maintain.

The improvement of cattle lies in the prompt disposal of all undesirable animals and in systematic breeding and rearing of the rest. Old dry cows, which yield neither milk nor calves together with male stock, not required for work, should be disposed of.

The best way to get rid of these animals is to fatten and sell them. The people in this country with their religious sentiments abhor the idea of sending their animals to the butcher, but they little think of the disaster they bring to the country by allowing them to live on semi-starvation rations and perish in fodder famines and epidemics which are common in India. If the population would just realize the amount of money wasted annually by maintaining all these useless animals, it must run into several lakhs of rupees. The money saved in the disposal of these would be useful in purchasing better animals and providing more food for the others.

In the improvement of livestock no factor plays so important a part as regular breeding. In most villages, the cattle are collected together on common grazing grounds all day long. They represent all types of animals, such as, cows, heifers, immature male stock (uncastrated) and some imperfectly muled male stock. When this is permitted it is impossible to prevent the cows in season from being covered. It is well known that unless well developed mature bulls are used for breeding purposes, the calves are puny and poor. No country can hope either to improve its cattle or maintain a good strain of cattle if such promiscuous breeding is allowed. The possession of a carefully selected bull is indispensable to a breeder, if he desires either to maintain or improve the quality of his cattle. The cow-keeper who does not possess a bull of his own should see that his cows are mated only to good bulls.

Regular and liberal feeding hastens maturity in heifers. Generally country heifers do not come into "season" until they are $3\frac{1}{2}$ to 4 years old, this period can be considerably reduced if the heifers are well fed and reared. This is a great advantage for the breeder. Heifers should not be allowed to get too fat as oestrus is liable to be delayed and they may even go barren.

A heifer or cow on heat should be taken at once to a good bull as the oestrus period only lasts from 12 to 20 hours and sometimes less in the hot weather. I have heard it said that if the cow is served as soon as the oestrus is noticed that the chances of obtaining a heifer calf are greater. In Madras some of the milkmen bring their cows for service two days after she has shown signs of heat, they grumble if the bull does not cover the cow, and if the bull does serve, it will most probably be fruitless. One service is quite sufficient if the cow is properly on heat. If a service is not effective, the cow will most probably come on heat again after three weeks. A careful look out should be kept from the 19th until the 22nd day after the first covering in order to ascertain whether heat has recurred. Some cows come on heat at irregular intervals.

The signs of heat (oestrus) are—

- (1) General restlessness.
- (2) Unusual bellowing and switching of the tail.
- (3) If at liberty the cow jumps on other cows and allows herself to be jumped.
- (4) In full heat there is a slight discharge of a slimy fluid from the vagina.
- (5) The cow passes urine frequently and in small quantities.
- (6) Some cows withhold the milk either altogether or in part when on heat.
- (7) During the heat, the vulva appears fully or slightly swollen.

If a cow comes into heat repeatedly, it is advisable not to allow the bull but to wash out the vagina with a weak solution of disinfectant and then allow the bull to cover her the next time she comes on heat.

Abortion or miscarriage occurs occasionally. It may be due to the nature of the food, butting by other animals, galloping or crushing through a gateway with other animals or a shock, or after inoculations against disease. Abortion may be caused by certain bacterial organisms; this is contagious and rigid separation of all animals which have aborted, from other cows, especially pregnant ones should be attended to at once. The vagina should be well washed out with a weak solution of disinfectant and the foetus should be burnt or buried in quick lime.

The average period of gestation for cows is 285 days and for buffaloes 310 days. A cow in calf should be given a little extra ration as she has to nourish the foetus, in addition to maintaining herself. In the early stage it is difficult to find out whether a cow is pregnant or not. As the period advances, the indications are that she does not come on heat again and there is improvement in her general condition. The abdomen enlarges particularly on the right side. The udder increases in size and a mucous discharge from the genital parts is seen. After the fifth month, foetal movements can be perceived by looking at the flank on the right side especially after she has taken a drink of cold water. A cow in advanced pregnancy requires special treatment, preferably, she should not be taken out along with other cows but should be confined to the calving shed and stall-fed. Slight exercise, however, both morning and evening is necessary. She naturally prefers a quiet place and avoids company. When the time of parturition approaches, as indicated by extraordinary swelling of the udder and occurrence of milk in it, white discharge from the vulva and dropping of the hind quarters, she must be provided with a bed of straw. People should not crowd near the shed, but

a watch may be kept at a distance. An animal near calving should not be roughly handled, it should not be frightened nor allowed to run or squeeze through narrow gateways or passages. The parturition generally lasts about an hour. If the labour is found difficult, the assistance of a Veterinary Surgeon should be sought. In ordinary cases, no meddling is required. The placenta comes away in $\frac{1}{2}$ to 4 hours, after which, if it is delayed, veterinary aid should be procured. It is always wise to call in a Veterinary Surgeon and not wait too long. A cow in milk should be fed well and regularly as milk production is an extra strain on the animal. A heavy milker must have more food than a poor one. An average cow requires 3 to 4 lb. concentrated food for her body up-keep and about $3\frac{1}{2}$ lb. of concentrated food for every 10 lb. or gallon of milk it gives. It is advantageous for a cow-keeper to keep a separate record of the milk yield of each cow so that he may have some idea as to which cow is paying or not. A cow that does not pay the owner for its upkeep should be disposed of as soon as possible. Only the cows which are profitable should be kept and treated kindly otherwise they will turn vicious and will not yield the maximum amount of milk. A cow can withhold milk at will. If possible one and the same man should milk the cow during her lactation. Some young cows come on heat 3 weeks after calving, they should not be bulled then but given a rest for $1\frac{1}{2}$ to 2 months before next bulling. After that period they may be covered by a bull at the earliest opportunity. Some people think that if a cow is got into calf whilst in milk that milk yield will decrease or stop altogether, this is not true. A good cross-bred cow should calve once a year and be in milk for 9 months in the year. If a cow continues to yield milk in her advanced pregnancy she must be dried off within 2 months of calving in order to give rest to the mamillary glands. If she is allowed to continue milking up to her calving, the milk yield in the following lactation will suffer. The lactation period of ordinary village cows in India is generally 6 to 7 months and they go dry for a long period. A good Indian cow should average a calf every year or 15 months. Cows which remain dry for a long time should either be worked or weeded out from the herd as they are a loss to the breeder. Some cows have a tendency to put on fat if fed liberally, instead of yielding more milk, such cows should be weeded out and sold. If they are fairly good milkers then the ration should be reduced until it is noticed that the milk yield does not decrease with the lowering of the rations. The yield of milk must be such that the cow is a profit earning machine when kept for milk alone. Unrestricted breeding of the unfit is certainly a great evil at present.

It is advisable to give a purgative such as Epsom salts after she has calved, she should be fed on a little cake and plenty of bran mash for a day or two.

Feeding.—Farm animals are supplied with food in order that they may convert it into such products as meat, milk, work and wool which are useful to man. Before they can do this, it is essential that they should be supplied with food to maintain all the essential life processes such as energy to walk about, replacement of body tissues and heat which is used up in the body. We all know that the temperature of an animal in most cases is a little above that of the surrounding air and this must be maintained continuously. Heat is produced by all the decomposition or oxidation taking place in the body whether of food within the digestive tract or nutrients in the muscular tissues or glands. The food supplied for this purpose is known as a "Maintenance Ration" and all cattle require this to live and keep up their condition.

If an animal has to produce milk or to do work, then it should be given extra food above the maintenance ration and this is known as the "Production Ration."

An animal in milk should be fed according to the amount of milk it yields. Suitable rations for cows yielding milk from 10 to 30 lb. per day are given below. All dry cows used for dairy or breeding purposes should be given a little concentrated food as part of the maintenance ration. If very good grazing or plenty of green fodder is available, this ration of concentrated food can be cut down.

		1.	2.	
Dry cows (maintenance)—				
Groundnut cake	.. ..	1 lb.	1 lb.
Cotton seed	.. ..	$\frac{1}{2}$ "	$\frac{1}{2}$ "
Rice bran	.. ..	2 "	1 "
Dholl husk	.. ..	..	1 "
Salt	2 oz.	2 oz.	Fed half in the morning and half in the evening. If stall-fed, 5 lb. fodder at 11 a.m. and 10 lb. at 6 p.m.
Straw or hay	.. ..	15 lb.	15 lb.

For every 10 lb. milk produced, increase the concentrated ration by $3\frac{1}{2}$ lb., i.e. (for every 3 lb. milk produced, increase ration by 1 lb. concentrated food).

If possible cows in milk should be given green grass or fodder daily and the amount of dry fodder reduced.

Rations for milch cow.

Cows giving milk per day.		Cake.	Cotton seed.	Rice bran.	Dholl husk.	Salt.	Mineral mixture.
		LB.	LB.	LB.	LB.	OZ.	OZ.
10 lb. milk	.. ..	2	$1\frac{1}{2}$	$2\frac{1}{2}$	1	2	1
15—20 lb. milk	.. ..	$2\frac{1}{2}$	2	$3\frac{1}{2}$	$1\frac{1}{2}$	2	$1\frac{1}{2}$
20—25 "	.. ..	3	$2\frac{1}{2}$	$2\frac{1}{2}$	3	2	$1\frac{1}{2}$
30 lb. milk and over	.. ..	$3\frac{1}{2}$	3	3	3	2	2

plus 15 lb. hay or fodder and some green grass or grass. If good grazing is available the concentrated rations can be reduced a little.

Cows in calf should be given a slightly increased ration for six weeks before calving in order to produce a strong calf and to increase the flush of milk at the time of calving. A suitable ration is—

Cake	..	..	..	..	..	2 lb.
Cotton seed	..	..	..	..	..	1 „
Rice bran	..	..	..	..	..	1 „
Dholl husk	..	..	..	..	..	1 to 2 lb.
Salt	..	..	..	..	..	2 oz.
Mineral mixture	..	..	..	..	..	1½ „
Fodder or hay	..	..	..	..	..	15 lb.

Rations for young stock.

Food.	Young bulls and heifers.	
	One to two years.	Two to three years.
Cake	1 lb.	2 lb.
Cotton seed	1 „	1 „
Rice bran	2 „	2 „
Salt	2 oz.	2 oz.
Mineral mixture	1½ „	1½ „
Fodder or hay	15 lb.	15 lb.

All young stock should be allowed to graze throughout the day if possible. If very good grazing is available, the above rations can be reduced.

Calf rearing and feeding.—As soon as a calf is born it is advisable to blow down its nostrils and mouth to clear the air passages. Calves are either allowed to suckle their dams or are weaned at birth, it depends on the method of business carried on. In purely cattle breeding it is better to allow the calf to suckle its dam but if a dairy business is carried on, it is advisable to wean the calf at birth. Both systems have their advantages and disadvantages. Allowing the calf access to its mother acts as a stimulus for the secretion of milk, the mother is contented and it ensures the udder being thoroughly emptied after each milking, the cow yields her milk freely and the calf gets its milk at the proper temperature. The disadvantages are that the cow may not give milk if the calf dies and that it is difficult to regulate the amount of milk to be left for the calf. The latter may be partly overcome by milking out the cow fully one day per week to ascertain her yield and a fixed amount may be milked out each day and

the calf allowed to suckle the rest. When the cow is fully milked out the calf should be hand-fed on milk that day. A young calf does not know how to drink milk at first; the method of teaching it is as follows. Put one or two fingers in the calf's mouth, allow it to suck, then lower the fingers into a bucket of milk and the calf will suck in the milk, after two or three days the calf will soon learn to drink the milk itself. When calves are weaned at birth, they are given a regulated and required amount of milk and the cow can be milked whether the calf is alive or dead, but there is no certainty of the milkman stripping the udder thoroughly. The latter is very important; if the udder is not thoroughly stripped and some milk is left in it, there is the possibility of the cow suffering from inflammation of the udder and this may result in the loss of a quarter. After the cow has calved, she should be milked and a portion of the milk fed to the calf or left in the udder for it to suckle. The milk yield for the first four or five days is called "Colostrum"; it contains a high proportion of albumen and curdles when boiled, it has some laxative principle and helps to clear the intestines of the calf of neonotium. If the calf does not get this milk on the very first day, give it a dose of castor oil. After birth the naval string of the calf should be tied with a piece of sterilized gut or cotton and the naval painted with iodine solution.

The calf should be fed at the rate of 6 lb. milk per day for the first two or three weeks, twice a day in equal quantities. If hand-fed the milk should be fed at body heat about 101°F. After this, the amount may be gradually increased to 8 lb. per day, fed twice a day in equal quantities. If rearing cattle for sale, it is preferable to feed the calf continuously on this ration for six to eight months plus concentrated food after it is two months old. If in the dairy trade and milk is sold, the milk ration for the calf can be gradually reduced after the first month and a gruel given in its place up to the age of six months. The gruel mixture is made up of separated milk 20 lb., ragi flour 2 lb. and linseed 1 lb., this is mixed, boiled, cooled and fed, sufficiently warm after adding an ounce of salt, it should be fed in equal quantities twice a day. After the first six weeks a little hay or grass can be given to the calf to pick at, also some scalded wheat bran $\frac{1}{2}$ lb. which should be fed lukewarm at 11 a.m. At 8 to 10 weeks old a little groundnut cake or ragi flour can be added. At 3 months old, $\frac{1}{2}$ lb. cake and 1 lb. wheat bran plus $\frac{1}{2}$ oz. salt and $\frac{1}{2}$ oz. mineral mixture should be fed to it in the middle of the day. Mineral mixture is essential in several parts of this Presidency, the soils in some instances being deficient in lime and phosphates, it is made up of finely ground limestone and steam bone flour in equal quantities. It can be purchased in Madras and Coimbatore. The concentrated ration should be gradually increased up to 1 lb. cake and $1\frac{1}{2}$ lb. bran at the age of 6 months.

This concentrated ration applies to all calves. If the calf is well grown at 6 months old, the gruel may be stopped gradually and the calf fed on—

1 lb. cake	} To be fed in equal quantities twice per day morning and evening plus fodder and grass.
$\frac{1}{2}$ „ cotton seed	
1 to $1\frac{1}{2}$ lb. wheat bran	
1 oz. salt	
$\frac{1}{2}$ „ mineral mixture	

The feeding of calves should be carried out at regular hours. If fed at irregular intervals, the calves' digestion might be affected. Milk should be fed at body temperature, if fed too cold or too hot, the calf will probably suffer from diarrhoea (white scour). Calves should be stalled in good clean sheds with a flag or concrete floor and provided with bedding of old hay or dry leaves and if possible an open yard for exercise should be provided. Calves should be muzzled for the first two months; these are made of thin coir rope and prevent the calves from licking and sucking one another and eating earth, etc. Hair balls and sand are often found in the stomachs of dead calves. Calves should be provided with plenty of exercise space as exercise is essential for their growth and health.

After the calf is weaned, it must be fed liberally and regularly in order to encourage continuous growth. There is generally a falling off in condition for a month after the calf is weaned. It is only a well-fed calf that will grow into a good bull or heifer. Bad or interrupted feeding during the early years tells upon the system throughout life. A stunted cow never produces as much milk as one which has been well maintained all its life. In addition to good grazing or supply of fodder or grass, which forms the bulk of food in cattle of all ages, the young stock should be given a certain amount of concentrates. Calves have to build up bone and muscle tissue, the latter contains nitrogen and it is essential that food rich in nitrogen should be fed to young growing stock. If the land is deficient in lime, and phosphates, mineral mixture should be fed to all the stock. Nitrogen is found in groundnut cake, cotton cake, cotton seeds and pulses. Any change in food must be made very gradually, otherwise disorders are apt to be engendered; milch cows especially are very sensitive in this respect, the first sign being a decline in the milk yield, though this will partly return if the change is to better food. Continuous use of rich food stimulates the cow to yield the most and best milk she is constitutionally capable of giving. Cotton seed has a binding effect on the bowels and this should be included in cows' ration; if they graze all day or are fed on green fodder, it also helps to produce a firmer butter if this is manufactured from the milk.

Suitable rations for calves are as follows :—

Suckling calves—

First month.—Six to 8 lb. milk per day according to size (fed half in morning and half in evening).

Second month.—Eight lb. milk per day (4 lb. morning and 4 lb. evening).

Three to six months.—Six lb. milk per day plus 3 lb. gruel fed at noon (if skim milk is available).

Hand-fed calves—

First month.—Eight lb. per day (3 lb. morning, 2 lb. mid-day and 3 lb. evening).

Two to three months.—Whole milk 6 lb. per day 3 lb. morning and 3 lb. evening (plus 3 to 4 lb. gruel at midday).

Three to six months.—Whole milk 2—3 lb. morning, gruel 6—8 lb. (3—4 lb. at noon and 3—4 lb. evening).

Gruel.—To every 10 or 12 lb. skim milk, add 1 lb. ragi flour and $\frac{1}{2}$ lb. of linseed; mix, and boil, cool and feed sufficiently warm, after adding about 1 oz. salt.

Concentrated ration for calves.

Age—months.				Ground-nut cake.	Cotton seed.	Wheat bran.	Rice bran.	Salt.	Mineral mixture.
				LB.	LB.	LB.	LB.	OZ.	OZ.
2—3	..	..	..	$\frac{1}{2}$	..	$\frac{1}{2}$	..	$\frac{1}{2}$..*
3—4	..	..	..	$\frac{1}{2}$	..	1	..	$\frac{1}{2}$	$\frac{1}{2}$ *
4—6	..	..	..	$\frac{3}{4}$ —1	..	1	..	1	$\frac{1}{2}$ *
6—9	..	..	..	1	$\frac{1}{2}$ †	1	$\frac{1}{2}$	1	$\frac{1}{2}$ †
9—12	..	..	..	1	$\frac{1}{2}$ †	1	1	1	$\frac{1}{2}$ †

plus hay or fodder and a little green grass.

* Fed at noon.

† Ragi flour or cholam may be substituted for this if necessary.

‡ Fed half in morning 7 a.m. and half in evening 5 p.m.

Buffaloes.—The treatment for buffaloes is similar to that of cattle with a few exceptions. They are of a hardy nature and can live on coarse food. They prefer low miry places to wallow about in. The young calves are delicate and some are difficult to rear. They often die of diarrhoea. This can be partly prevented by regulating the quantity of milk given to them and as the milk is very rich in fat, it is advisable in some cases to dilute it with warm water and hand feed it to the calves. Generally buffaloes milk without their calves and there is no difficulty in separating them. Buffaloes are more suitable for dairy purposes where butter and ghee are manufactured as the milk contains much more fat than cow's milk.

JUDGING A DAIRY COW.

The points to notice in selecting an animal are the general appearance denoting constitution and milking qualities and the conformity to type which is noticeable in all well bred animals, secondly the shape and capacity of the udder and the size of milk veins and teats, thirdly the general indications of suitability for dairy purposes.

The ideal cow should be wedge shaped, the side lines tapering from the hind quarters towards the neck. Certain portions of a cow's body have an undue amount of work which tends to their development in an extreme degree, while the other portions because of their activity and lack of nourishment do not develop to the fullest degree. A cow of good dairy qualities when she is milking freely is likely to be of a lean appearance over every part of the body showing that she is an animal of nervous organization and further that she utilizes all her food for the production of milk and not for the putting on of flesh. The cow should have a feminine and docile look, neck should not be thick, the head should be fine and face long and lean. The eye should be full, mild and bright and more or less active. A quiet disposition is reflected by a mild eye, while one that is bright is indicative of vigorous circulation and good health. Large dilated nostrils permitting easy access of air to the lungs are usually associated with depth of chest and lung capacity. The dewlap should be thin and silky to the touch, it is noticeable that animals with fairly large fleshy dewlap covered with fine silky hair hanging in folds are generally good milkers. The ears should be fairly long and of fine quality. I have heard it said in India, that, if a cow could not flap its eyes with its ears, it was not much use. The horns should be small and not coarse. The neck should be fine, a thick neck giving a masculine appearance and a beefy type. The hump should not be too fleshy or big and the shoulders tight and oblique. The barrel should be deep and large, the ribs should be long and well sprung, the backbone prominent, and strong and the back lean. The hip bones should be prominent and wide apart and almost level with the back, the rump long and wide. From the point of the hip to the tail head, there should be a marked hollow or shrinkage, due to the absence of flesh, a condition characteristic of heavy performers when in full milk. The thighs should be long and lean and the flanks thin, the tail should be well set on, fine and tapering, reaching down well below the hocks and carrying a good switch. The hocks should be wide apart and set square with plenty of room allowed for the udder. The udder should be full and capacious but not fleshy, and attached high, while the forequarter should extend far forward, it should be silky to the touch, flat underneath and well rounded behind, each quarter being sound and the teats easy to draw. Length in the udder is

important, as it gives a long line of absorption. The udder not only secretes milk from the blood but it is also a receptacle for holding the milk. The teats should be evenly placed, of suitable size and squarely set on. Milk veins should be large and branched.

When viewing the cow from behind, it will be observed that the hair on the thighs and the region above the udder runs in the opposite direction from that to which it inclines on the other parts of the body. Where it does this, it is known as the "escutcheon" to which attention was first directed by Guenon. It is supposed that the reason of this hair growing in the direction mentioned is due to the artery which passes this part. The artery supplying the udder with blood also nourishes the skin on which the escutcheon grows. Guenon enumerates eight classes and eight orders, or in other words, eight different shapes and eight different sizes. He claimed that the shape was indicative of the quantity and the size was an index of the duration of the milk flow. The broader it extends over the thigh and the greater the length of it, the better the escutcheon is considered to be. Guenon believed that the thigh escutcheon indicated the quantity of milk the cow gave, while the upper portion or vertical escutcheon the length of time she would milk and with these he considered the feel of the skin, the character of the hair and the colour of the skin as indicative of the quality of the milk.

The "touch" which is best judged by taking hold of a portion of the skin and flesh behind the last rib should be "mellow," the skin loose and rather thin and of a slightly oily nature and the hair soft and velvety. The skin should not be dry. The cow should present an alert but docile appearance. Generally speaking a good dairy cow possesses a loosely knit frame.

THE VALUE OF RECORDS OF THE MILK YIELDS OF COWS.

The practice of keeping records of the quantity and quality of the milk yielded by dairy cows has made great progress.

The system is of value to the milk seller, to the butter-maker and the breeder, according to the object for which the cows are kept. It enables the milk seller to know exactly what yield his herd of cows are giving and the quantity and quality of the milk given by each individual animal. He can thus identify cows which systematically give a low yield or produce milk of low quality and by disposing of them, prevent the loss due to maintaining cows

that are not worth their keep. It must be remembered that some cows give large daily yields for a comparatively short period while others give moderate daily yields over a long lactation period and a difference of 300 or even 500 lb. is not easily appreciated when spread over the whole period. When milk sells at 2 annas per lb. a difference of 500 lb. represents Rs. 62 and it is probably not too much to say that cows in the same herd frequently differ in their annual production by as much as Rs. 100 without their owner being aware of it. When butter is made, the importance of obtaining milk with a high percentage of fat is obvious, while to the breeder the practice of milk recording is perhaps even more important, as by this means he can select with certainty his best cows, and bulls descended from his best cows, for breeding purposes.



MODEL MILKING SHED, MADRAS AGRICULTURAL COLLEGE DAIRY,
COIMBATORE.

Value of milk records to the dairy farmer.—The practice of keeping milk records in addition to enabling the dairy farmer to distinguish between superior and inferior cows, has many other advantages. Among these advantages are the following:—

- (1) Any slight reduction in yield will be noticed, and investigation as to the cause can be made out at once. For instance, when a cow is unwell, her milk yield generally diminishes; milk records therefore may often be the means of detecting an ailing cow.

- (2) Feeding may be carried out more economically. Since the market price and milk producing value of foods are not necessarily directly proportionate, it is quite possible to feed a cow expensively and not produce any better results than could be obtained from cheaper foods.
- (3) Where milk records are kept, the influence of change of food and the effect of different climatic conditions, can be noted.
- (4) There is increased interest on the part of the dairyman. The faculty of observation is developed, cause and effect in milk production are studied side by side and a stimulus is given to the further study of data bearing on the work. Records have therefore a distinct educative value.
- (5) Milk records supply data which enable the breeding, selection and feeding of cows to be conducted in an intelligent manner and they thus materially assist in placing dairy farming on a sound business footing.
- (6) Milking qualities are largely hereditary, and the progeny of a heavy milking cow are likely to inherit the characteristics of their dam. It is therefore of the first importance that the dairy farmer should have a record of the performances of his cows and should select the heavy milkers of good constitution to breed from, for his own herd. Dairy qualities are also transmitted through the bull used; it is equally important to be able to know with certainty that he is descended from a heavy milking strain.

Simple records of milk yields.—In its simplest form a record of milk yield of cows may be kept without difficulty and the small amount of time and trouble involved is well repaid by the value of the information obtained. All that is required is a spring balance in which a pail can be hung. Balances provided with dials, on which the weight of the pail is allowed for should be used. The milk of each cow can thus be recorded easily, and should be noted in a sheet ruled for the purpose and hung in some convenient position.

If the trouble of recording the milk of each cow twice daily, viz., morning and evening is felt to be too great, an approximately accurate result can be obtained by recording the yield morning and evening on a fixed and corresponding day every week and multiply by 7. Experiments have shown that the error is not likely to be more than 3 per cent.



GROUP OF BELLARY RAMS AT HOSUR.

SHEEP-BREEDING.

It is seen from the Season and Crop Report for 1930-31 for Madras that there are 12,864,343 sheep and 7,406,018 goats in the Presidency and that Madras possesses more sheep than any other Presidency or Province in India; these animals are mainly of the hairy variety.

The chief breeds of Southern India are divided into two classes :—

- (1) The Woolly; and
- (2) The Hairy.

Woolly breeds—(1) *The Bellary sheep*.—This is a mixture of a black and a white breed. Prevailing colours are black, grey, white with black face and a few pure white. The latter are small and weak. Rams have twisted horns, ewes are hornless. Square body; do not fatten well. Wool is very coarse. Average wool yield under good conditions: Ram 4 to 7 lb., ewe $1\frac{1}{2}$ to 2 lb. In the district 1 to $1\frac{1}{4}$ lb. weight of good ram 120 lb. ewe 60 to 70 lb. Mutton average quality.

- (2) *The Coimbatore sheep*.—Is similar to the Bellary sheep. It is said that a little of the Persian breed is mixed with this. Colour white with black or brown heads and on

the neck. Compact body, fairly good mutton and fatten well. Wool is coarse. Wool yield is 1 to 1½ lb. Average weight of sheep is 50 to 60 lb.; rams are heavier.

- (3) *Kolar sheep*.—Bred on the Mysore plateau around Kolar and Bangalore. Colour is white and white and brown. Rams have twisted horns, ewes are hornless. Slightly smaller than the Bellary sheep. Live-weight is about 45 to 60 lb. Rams are heavier. Wool yield is about 1½ lb. Mutton is good. Merino rams have been introduced for crossing purposes, the graded flocks produce more wool and of a much finer quality.

Hairy breeds.—*The Madras and South Indian*.—This breed is found over the whole Presidency. The sheep have tucked up bellies, light feet, bony limbs, flat sides and short tail. The rams have horns. They are covered with short coarse hair, whose colour is generally red or brown. They have, as a rule, a couple of pendulous lobules hanging from the throat, known as "Munies" that is bells. Live-weight is about 40 to 60 lb. The sheep in Anantapur are known for their good mutton.

The Nellore.—The sheep are large in size and very tall. The rams have twisted horns and weigh up to 150 lb. live-weight. The average weight will be about 80 to 100 lb. The colours are white and brownish white, some are black and brown. Body is densely covered with short hair. Mutton is fairly good.

On the Nilgiris, one finds traces of imported blood in many of the sheep but the size of the present sheep is very small. The wool in some cases is quite good.

The climate and rainfall of Southern India with the exception of the West Coast are suitable for sheep-breeding and one finds them all over the Presidency, they receive little attention and have to exist on the grazing which they can pick up. Hairy sheep are found in the hot districts and the woolly variety in places where there is a moderately cold weather such as Bellary, North Salem, Coimbatore and the Nilgiris. Sheep are common in places where there is scrub jungle to graze in and where there is cultivation as they rely on grass and herbage of their feed. They graze on field bunds, stubble and fallow land and are penned at night on ryots' lands for manurial purposes.

Sheep are generally owned by poor people who rely on them for their livelihood. The flocks are small and vary from 25 to 50 and 100 on the average. Some combined flocks run up to 2,000 head. The shepherds are ignorant and conservative and the tendency is



BELLARY SHEEP,
HOSUR.
*Showing pure-white
and white-black
face rams.*



to be naturally controlled in their operations by tradition and superstition. They pay no attention or very little to the selection of their breeding rams, young rams in the flock are allowed to serve the ewes, there is no regular breeding season, the rams run with the ewes all throughout the year and breeding goes on continuously and perhaps ewes have 3 lambings in 2 years.

Sheep are maintained for mutton, manurial purposes and their skins chiefly. The large Nellore hairy sheep is the largest and a well-grown one will kill at 70-80 lb. dead-weight; these supply the Madras market. The Madras sheep is a small hairy animal and will kill at about 20 to 30 lb. dead-weight according to the season of the year. Anantapur district sheep are well known for their mutton and they fetch good prices in the Bangalore market. The sheep in the south are utilized there, and a large number are shipped to Colombo and Ceylon for meat purposes.

In order to produce good mutton, the sheep must be well fed and so we find that we get the best mutton at the end of the monsoon and the poorest at the end of the hot weather. An average sheep fed on grazing, sells for about Rs. 5 to Rs. 7 on the average.

Shepherds pen their sheep on ryots' land at night for manurial purposes and they are paid at the rate of so much per 100 or 1,000 per night. They are penned in fields for two or three nights, this system is practised quite a lot.

The woolly variety are bred for their wool, mutton and skin. These kill on the average at about 25 to 30 lb. dead-weight.

Breeding and rearing.—Ewes kept for breeding should be young and carefully selected. The wool has to be as fine and free from hair as possible. Hair is the natural covering and its absence, and the presence of wool and the quality of the latter, can only be secured by "artificial selections" and good treatment. Ewes should have good mouths, udders, fleeces and conformation and be between 1 and 3 years old. Old ewes and those with defects should be weeded out frequently. One ram will suffice for 40 to 50 ewes. Rams in the district run with the flocks always. On Government farms, rams are kept separate and are run with the ewes in August and September and in March-April, one ewe being allowed to lamb once only in the year. It is advisable to "flush" the ewes for 2 or 3 weeks before and at the time of mating them, feeding them on a little cake and bran and some green fodder.

The average period of gestation in sheep is 5 months or 150 days. Ewes should be fed liberally at lambing time on cake, bran and green fodder or grass say $\frac{1}{2}$ to 1 lb. of concentrated food per

head per day. Lambs are weaned after 3 or 4 months. Generally, in India, lambs are not castrated till after a year old, it is desirable they should be castrated at the age of 14 days or so. The weight of a lamb at birth is about one-tenth to one-twelfth of the weight of the dam. A sheep attains its full growth and weight at the age of 3 years.



RAM LAMBS OF BELLARY SHEEP.

Feeding.—Sheep are fed on pastures, grass bunds, fallow fields and are kept out in the open all the year round. In the hot weather when grazing is very poor, they fall considerably in condition. No provision of any artificial food or of any fodder, green or dry, for such season is made. Sheep will feed on and keep down weeds.

Shearing and wool yield.—The average wool yield is about 1 lb. per head, it is a coarse wool and is used for carpet making and the manufacture of kumbliies.

In India the sheep are clipped once yearly either in the hot or dry part of the year—April–May—or in the cold dry season—January–February. In some places shearing is done twice a year—April and October; this encourages a larger yield of wool. Some good woolly sheep are seen in the Nilgiris and the quality of the wool is good, there is a mixture of imported blood in these sheep but the shepherds very rarely clip them. The Merino graded flocks produce a good quality of wool and this realizes up to Re. 1–2–0 per

lb. as against 4 to 5 annas per lb. of white wool from the Bellary or Coimbatore sheep. Sheep should be washed before they are clipped. All grass seeds, twigs and bits of twigs should be removed, this facilitates shearing and a clean wool is obtained.

Dipping of sheep is not practised in South India, this is necessary in order to kill parasites such as ticks, lice, etc., which suck the sheep's blood and thus reduce their condition and damage their hides. It is generally done after shearing when the fleece is about $\frac{1}{2}$ inch long. The sheep are immersed in a dipping bath containing a solution of arsenic preparation for one or two minutes; afterwards their heads are immersed for a few seconds only and during this operation their mouths and nostrils are held to prevent any of the solution getting in. Another dipping is necessary in 3 to 4 weeks time in order to kill any young parasites which have hatched out.

Wool.—There are three kinds of wool in every fleece:

Prima from the neck and back,

Seconds from the tail and legs, and

Thirds from the breast and belly.

Under the microscope it shows a finely serated structure all the teeth pointing upwards and inwards from root to top. The finer the wool, the greater the number of serations to the inch. Fineness is also due to smallness of fibre; coarse wool is $1/450$ of inch and fine wool $1/1,500$ of inch in diameter.

Wool consists of pure wool, hair and fat (wax). The fat is an excretion of the perspiration glands of the skin, it is soluble and therefore washed out; in the Merinos, it is over half the weight of unwashed fleece, in ordinary sheep exposed to the weather, it is about 15 per cent. Short fine wool has most fat. Ordinary washing reduces the weight of the fleece from 25 to 33 per cent.

The first wool grows on the shoulder and this is taken as the standard for comparison with other parts in stapling, the ribs, thigh, rump and hinder parts follow in order. A fleece is classed for fineness, length and density.

Skin trade.—The trade in sheep skins is important in this Presidency. A skin realizes anything from 4 annas to Rs. 1-8-0 according to the size. Considerable damage is done by ticks to the skins and naturally the shepherd suffers loss.

Diseases.—These carry off a large percentage of the flocks each year. Lung diseases, anthrax, blackquarter, hæmorrhagic septicaemia, etc., take their toll. During the hot weather there is little or no grazing and the vitality of the sheep is considerably lowered; therefore flocks are very liable to attacks of disease when the monsoon breaks with the cold winds and wet weather.



WHITE RAMS.
Bellary sheep.



WHITE RAM MATED TO WHITE EWE WITH OFFSPRING.

Flock of Bellary sheep at the Hosur Livestock Research Station.

In 1925 the flock of Bellary sheep were transferred from Hagari to Hosur.

Description.—This breed is of the woolly variety and is evidently a mixed breed of white and black, most of the sheep are white with a black face and black marks on the ears and heads. When these are mated, we get a good number of white black face lambs, pure black lambs and a few pure whites.

Object.—The object is to try and evolve a strong hardy flock of white sheep which will breed pure, will yield a fair amount of wool and will fatten quickly. This is desired as white wool realizes about double the price of the black wool.

Colourings.—The different colourings are described below :—

Pure white.—These are known as white-faced or W.F.

White-black-face.—White body with black on head and face —W.B.F.

Pure black.—These are known as black.

Piebalds.—There are a few of these and they are classed as black.

Pure black is easy to attain as the mating of black rams with black ewes has resulted in an average of 7 black lambs to one white-black-face, whereas the mating of white-black-face rams with white-black-face ewes has resulted in an average of 3.56 white-black-face lambs to one black. The proportion of pure whites born is about one in twenty to twenty-five.

Altogether 44 white lambs have been born at Hosur out of which 29 have died and 4 have been sold. It is to be noted that the pure white lambs are weak in constitution on the whole, they are smaller in size and do not grow so well as the other lambs. There is a tradition in the Bellary district amongst the shepherds that the whites are more delicate than the blacks or white-black-face and this is proved at Hosur.

The deaths include 12 lambs one month old or under, 5 lambs two months old, 6 lambs three months old and 4 lambs four months old. The chief causes of death are Gastro enteritis, pneumonia and general debility.

At the present time (1933) there are white sheep :—

Ewes	...	...	...	...	...	...	...	4
Rams	...	...	...	...	...	...	...	3
Lambs	...	...	...	...	...	...	...	9

The breed responds to good treatment by improving its wool yield and a slight increase in its carcase.



SEVEN-EIGHTH MERINO-HISSAR RAM AT STUD IN KANGUNDY
ZAMINDARY, CHITTOOR DISTRICT.



PROGENY OF THE CROSS BETWEEN SEVEN-EIGHTH MERINO-HISSAR RAM AND KOLAR
SHEEP AT KANGUNDY IN CHITTOOR DISTRICT.

The wool yield has increased since the flock came to Hosur as is seen below :—

				LB. OZ.
Hagari 1923	..	..	..	1 13 per head.
Do. 1924	..	..	..	1 5 do.
Do. 1925	..	..	..	1 9 do.
Hosur 1926	..	..	..	2 0 do.
Do. 1932	..	..	..	2 11 do.

The increase at Hosur is due to better grazing and a cooler climate, the sheep were practically the same in each case.

The wool is 4 inches to 6 inches long in staple and some are coarse in texture.

The following gives some idea of the growth of the animals in body-weight :—

	LB.
Average weight of lambs at birth	5
Average weight of lambs 3 months old	34
Average weight of lambs 10 months old	54
Average weight of lambs 15 months old	63
Average weight of adult ewes	69

The weights appear satisfactory.

Breeding.—Ewes are mated to the rams either in April or October. Ewes failing to lamb in September are mated to the rams in October. Ewes are only allowed to lamb once in the year. The number of lambs born during the last three years works out to 91 lambs to 100 ewes per annum.

Health.—This is good. There are occasional attacks of diarrhoea or tympanitis due to too much green grass. During July to September the older ewes get a discharge from the nostrils due to a fly which deposits its eggs there; treatment soon overcomes this malady.

Black sheep.—No black sheep are kept for breeding purposes. The lambs are sold away after weaning. Breeding is confined to pure whites and white-black-face.

White sheep.—We have not gained very much in this period in attaining a white flock. Altogether 44 white lambs have been born, of which 29 have died as described previously. Mr. Woodford, the previous Superintendent at Hosur, did not believe

in pampering the white lambs with inherent weak constitutions and so did not give them special treatment and I agree entirely with him. No white lambs or sheep were sold and if any survived along with the other sheep in the flock all well and good. The present Superintendent however has fed Cod-liver oil to the white lambs and has succeeded in raising a few to maturity. At present we have four pure white ewes, three rams and nine lambs alive.

Mating of white rams.—Three white rams have been mated to ewes of pure white and white-black-face, with the following results :—

	Number of ram.	Number of services.	Number of failures.	Number of lambs born.	Number of lambs died.
637	9	2	7	1
654	18	1	17	9
702	16	5	10	7 (1 aborted.)

Results of mating three pure white rams to pure white ewes :—

	Number of ram.	Number of services.	Number of failures.	Number of lambs born.	Number of lambs died.
637	3	2	1	1
654	2	1	1	1
702	1	..	1	1

From the above it is seen that the pure white matings so far have proved a failure, all the lambs born to such matings have died.

Taking all the matings of the three rams which number 13, eight have been fruitless, 34 lambs have been born of which 17 (50 per cent) have died and this can hardly be looked upon as a success.

Ewes.—Four white ewes have been reared, their performances are :—

	Number of ewe.	Number of services.	Number of failures.	Number of lambs born.	Number of lambs died.
503	4	1	3	3
534	4	1	3	2
595	3	1	2	1
857	1	..	1	..

It is assumed from this that there is some constitutional weakness in the pure white sheep.

Weights of white sheep—Rams.—It is seen from the following table that the weights of these rams are on the average 37 lb. less than those of white-black-face, the heaviest ram weighing 95 lb. as against 123 lb. of a white-black-face ram. This is not good from a mutton point of view.

Statement showing comparative weights of pure white rams and white-black-face rams :—

White rams.			White-black-face rams.		
Number.	Born.	Weight.	Number.	Born.	Weight.
		LB.			LB.
654 ..	28th September 1928.	84	429 ..	11th October 1926 ..	123
702 ..	30th March 1929 ..	95	529 ..	12th October 1927 ..	123
775 ..	21st March 1930 ..	88	567 ..	1st March 1928 ..	120
842 ..	3rd October 1930 ..	74	728 ..	23rd September 1929.	123
Average ..		85	Average ..		122

Ewes.—There is not so much difference in the weights of the ewes, the average weight of white-black-face is 67 lb. and the average weight of three white ewes is 61 lb.—a difference of 6 lb.

Wool yields of white sheep.—The highest wool yield for a white ram in one year is 4 lb. 6 oz., as against yields of 7 lb. 8 oz., 6 lb. 15 oz. and 6 lb. 11 oz., of white-black-face.

The highest wool yield for a white ewe is 2 lb. 12 oz., as against 3 lb. 4 oz. of a good white-black-face; the average wool yield of three white ewes is 2 lb. 2 oz. as against 2 lb. 10 oz., of four average white-black-face ewes.

White ram No. 842, 2 years old has given a yield 4 lb. 6 oz. this calendar year. He is being mated to a few ewes and results will be watched.

From a breeding point of view, it is seen that after eight years work at Hosur it has not been possible to evolve any really good white sheep of either sex without pampering. The sheep on the whole are constitutionally weak and not so strong or robust as the others. Their weights, wool yields and breeding records fall much below that of the white black face. Work will be continued and hope is not given up of eventually raising some good white sheep.

Wool yield of the flock.—The two strains selected by the late Superintendent Mr. Woodford have proved a success and he is to

be congratulated on his selection. He selected Rams Nos. 127 and 167. After testing, etc. he put Ram No. 167 as the best ram and this has proved a success as seen from the following results :—

Number of ram.	Highest yield in calendar year.		Average yield all clipping.	
	LB.	OZ.	LB.	OZ.
Progeny of Ram No. 167—				
348	6	8	5	13
469	8	8	7	3
567	6	3	5	7
Average ..	7	1	6	2
Progeny of Ram No. 127—				
429	5	7	4	11 $\frac{1}{4}$
529	4	15	3	15
Average ..	5	3	4	5

In 1928 the average annual clip of the offspring of Rams 167 and 127 were 1 lb. 15-5/6 oz. and 1 lb. 11-3/5 oz. respectively. The progeny of these rams have been used during the last 4 years and the average annual clip of the offspring is as follows :—

			Average.	
			LB.	OZ.
No. 167 strain—				
Ram No. 348	2	10 $\frac{3}{4}$	}	3 0 $\frac{5}{8}$
Ram No. 469	3	7		
No. 127 strain—				
Ram No. 429	2	13 $\frac{1}{4}$	}	2 11 $\frac{1}{8}$
Ram No. 529	2	9		

Ram No. 167 strain is thus superior to that of Ram No. 127 as regards average wool yield.

Unfortunately most of the lambs born to Ram No. 469 had very small or rudimentary ears and when this ram was carefully examined it was found that its ears were small, therefore it was discarded for breeding purposes and the imperfect progeny were sold. Two ram lambs of this strain (167) Rams Nos. 728 and 781 have been retained, one has given 6 lb. 8 oz. and the other 7 lb. 4 oz. in a calendar year, another ram of this strain No. 348 has given 6 lb. 3 oz. wool this year.

Two rams, the progeny of Ram 429 (127) have been retained. Ram No. 823 has given 6 lb. wool this year and No. 899 which shows promise has yielded 3 lb. 8 oz. in its first year's clip.

The average wool yields up to date are as follows :—

Year.					Weight.	
					LB.	OZ.
1923	..	..	..	..	1	13
1924	..	..	..	..	1	5
1925	..	..	..	..	1	9
1926	..	..	..	..	2	0
1927	..	..	..	..	1	15
1928	..	..	..	..	2	4
1929	..	..	..	..	2	6
1930	..	..	..	..	2	5
1931	..	..	..	..	2	12
1932	..	..	..	..	2	11

The wool yield has steadily increased, a number of old ewes have been sold and the young ewes should improve in their yields in the course of another year or so.

Carcase.—The conformation of the sheep continues to be satisfactory the best wool yielders showing the best carcass. Their legs on the average are shorter, the back is flatter and wider and the neck is thicker. It is found difficult to fatten these sheep even when they are grazing on good young grass. The Madras Race Club which has a flock of these sheep report the same.

Method of feeding.—Sheep are grazed at Hosur throughout the year, the ewes are given about $\frac{1}{2}$ lb. concentrated food ($\frac{1}{4}$ lb. ground-nut cake and $\frac{1}{4}$ lb. rice bran and a little salt) a month before they are mated and during the mating time; this improves their condition and induces them to come to heat sooner. This lasts altogether for about 2 months. The rams are given concentrated food a month before mating and during the mating season; about $\frac{1}{2}$ lb. cake and $\frac{1}{2}$ lb. rice bran per head. The ewes are given concentrated food 2 to 3 weeks before lambing— $\frac{1}{2}$ lb. per head and a month after lambing. All sheep are given hay and green grass at night in their pens and silage in the dry season. It is not advisable to turn ewes which have just lambed and also young lambs on to grass whilst the dew is on it as this tends to scour them. They should be turned out when the grass is dry.

Housing.—They are housed in covered sheds and given plenty of ventilation. At lambing time the in-lamb ewes are kept in a separate shed and the ewes with lambs in another shed and so on. A bedding of dry leaves is given.

Dipping, washing and shearing.—Sheep are dipped twice a year in Cooper Sheep dip to kill ticks and other vermin; they are washed before clipping and are clipped twice in the year in March and September generally. The ram is run with about 40 ewes at tupping time and is left for 3 weeks with them so that he can perform a second service if necessary.

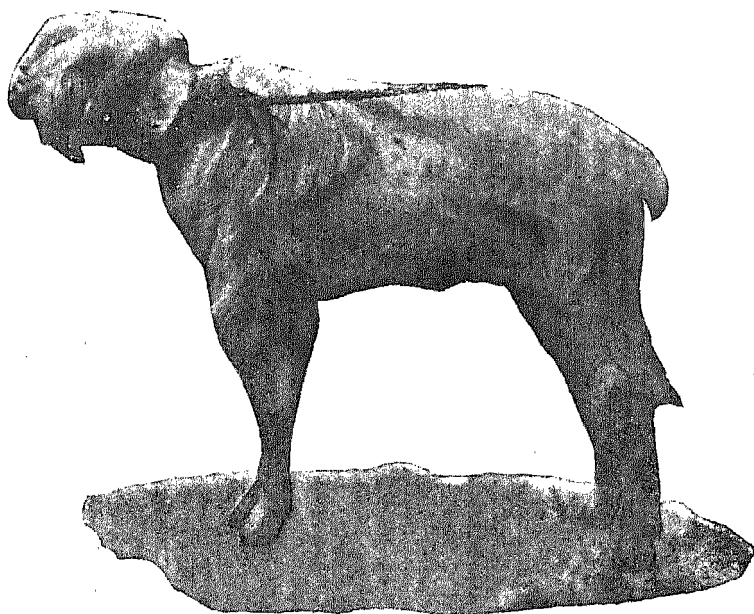
MILCH GOATS.

During the last 20 years goat breeding and rearing have increased considerably in Malabar. It is estimated that there are about 2,200 goats and kids maintained in the neighbourhood of Tellicherry town alone for supplying milk and towns such as Calicut, Cannanore, Badagara and Ponnani maintain large numbers for their milk supply. In Kottayam taluk there are about 10,000 country goats, the majority of these are utilized for supplying meat for the people.

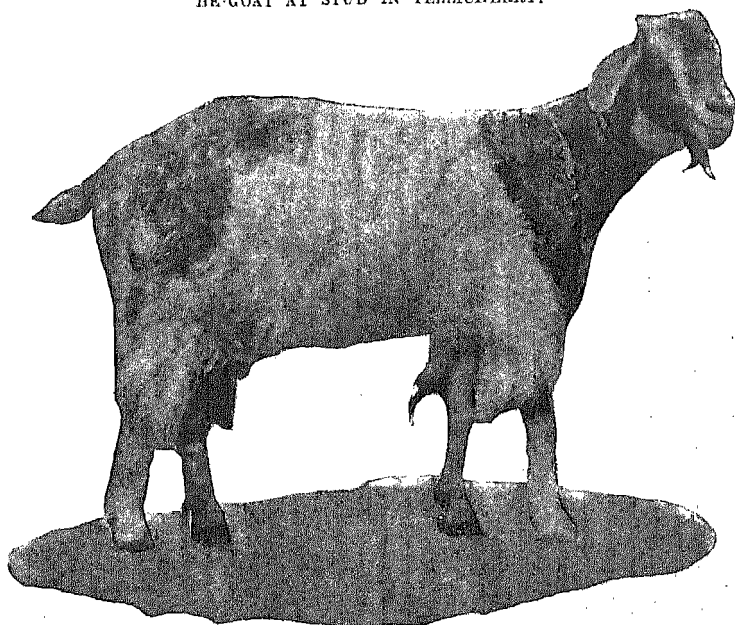
In the interior villages the country goat is chiefly kept but in the towns along the coast, we find a mixed breed and not pure, there are strains of Scindh, Surat, Cutch and Arab blood. Goats of these breeds have been imported at times by rich Muhammadan merchants from Bombay and other northern parts. There has been promiscuous breeding and the result is a very mixed breed. Very few pure bred goats (if any) are seen now.

The colour of the goats vary from pure white to pure black and brown with mixtures of these; some have short smooth coats and others long rough coats, the goats which contain Arab blood have very long ears and two fleshy appendages hanging from their necks; some have a distinct beard, the chief colour being white or white and brown. The body is wedge shaped and of a dairy type. The udders are fairly pendulous and teats are of good size. The goats with a mixture of Scindhe breed in them are hornless and are white and brown in colour.

She-goats are generally served for the first time at the age of 9 to 12 months. The number of kids born vary from 1 to 3; occasionally 4 and even 5 kids are born at one kidding. The lactation period lasts about 6 months and the daily average yield is estimated at about 2 lb. per day. The maximum yield in one day is about 5 lb. Kids are generally weaned by the end of the second month and fed on bengalgram paste, Kanji water, etc. They also begin to eat grass and leaves. She-goats in milk are fed on $\frac{1}{2}$ lb. coconut cake, $\frac{1}{2}$ lb. gingelly cake, some give in addition to this, about 1 lb. bengalgram crushed and soaked, whilst others give black



HE-GOAT AT STUD IN TELlichERRY.



MILCH GOAT.
(*Tellicherry.*)

gram and a little ricebran. The average quantity of concentrated food given to she-goats in milk is about $1\frac{1}{2}$ lb. per head per day plus plenty of jack tree leaves. The latter is the main bulky fodder for this class of animal and a large head load of these costs about 3 to 4 annas. She-goats are generally served at the end of the third month after kidding and their period of kidding is once in eight or nine months.

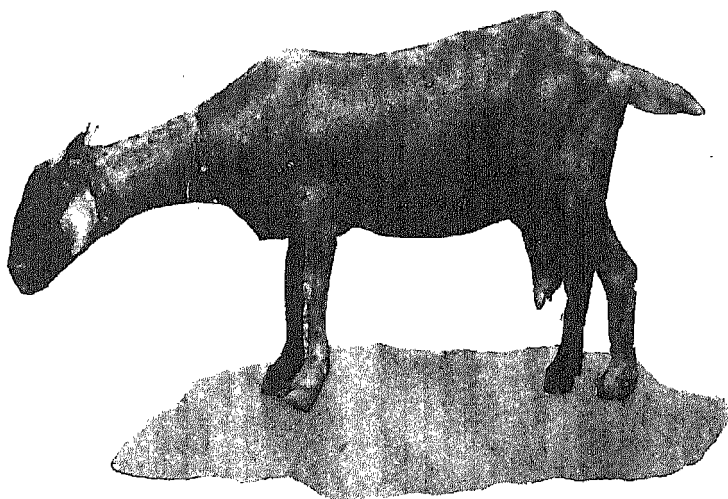
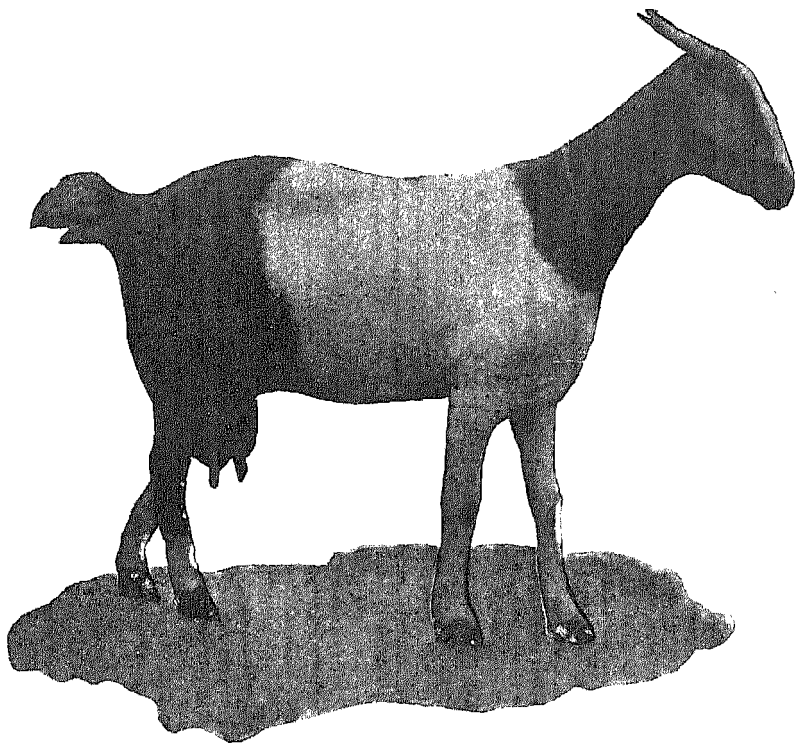
For the first 2 months, the kids are allowed to suckle and get on the average $\frac{3}{4}$ lb. milk per day; after 8 weeks they are gradually weaned and are fed on bengalgram paste and allowed to feed along with the she-goats at feeding time. She-goats have their udders protected by a cloth bag to prevent the kids suckling. Male kids are sold generally at 6 months old for Rs. 5 for rearing for meat, the she-kids being retained.

There are few male breeding goats maintained as such, most of the crossing being done by male kids up to one year old when they are sold away for meat. The adult he-goat has a very distinctive and offensive smell and this combined with its vicious nature deters people from maintaining them. The service fee charged is 3 to 4 annas. He-goats are generally fed on 1 to $1\frac{1}{2}$ lb. concentrated food plus jack tree leaves. He-goats are generally fit for full service at a year old. A good he-goat will stand about 30 inches high at the withers.

Goats are housed in the towns in sheds made of stone or mud walls with a thatched roof. In many cases the floors are made of earth and small wooden platforms of planks are provided for the goats to rest on. The urine soaks into the earthen floor and wood and gives the shed a strong characteristic smell. In some instances a coarse cement floor is found in some sheds; these are washed daily and kept in a clean condition. In the interior districts, country goats are housed in a wooden shed which is supported on posts or pillars about 6 feet in height in order to protect them from wild animals at night. A plank with strips of wood nailed across it is used for entry and exit and this plank is removed at night time.

A good she-goat aged about 2 years old in full milk will realize about Rs. 25. In some cases she-goats fetch as much as Rs. 45 or over. A male breeding goat, 1 year old, is worth about Rs. 15.

The Agricultural Demonstrator, Tellicherry, Mr. E. K. Govindan Nambiyar has collected figures from a reliable goat keeper in Tellicherry who maintains about 20 goats and kids and supports his family out of the proceeds on these. There are 10 she-goats in different stages of lactation.



MILCH GOATS.
(*Tellicherry.*)

Receipts—

	lb.
Daily average milk yield 12 bottles	18
Adds about 25 per cent of water	4
	<hr/>
Total ...	22
	<hr/>

This is sold at 2 annas per lb.=Rs. 2-12-0 per day. Over and above this, he sells 10 he-goats on the average at Rs. 5 each and also 2 old she-goats in milk at about Rs. 20 each, thus realizing about Rs. 90 by the sale of animals.

The family utilize the twigs and branches of jack tree for fuel after the goats have eaten the leaves and this is estimated to be worth one anna per day.

The droppings are utilized by the family principally for fuel and any surplus for manure. It is estimated that this is worth 2 annas per day either as fuel or as manure.

Expenses

	RS	A.	P.
15 lb. cake is used per day : cost	1	0	0
3 bundles of jack tree leaves at 4 annas	0	12	0
1 boy at 3 annas per day	0	3	0
	<hr/>	<hr/>	<hr/>
Total ...	1	15	0
	<hr/>	<hr/>	<hr/>

This can be reckoned at Rs. 2 per day approximately. Repairs to the shed can be taken at Rs. 12 per annum.

Expenses.			Receipts.		
	RS.	A. P.		RS.	A. P.
Cost of food, labour, etc.	730	0 0	By sale of milk	1,008	0 0
Repairs to building	12	0 0	By sale of goats	90	0 0
Profit	424	4 0	Value of branches	22	12 0
			Value of manure	45	8 0
	<hr/>	<hr/>		<hr/>	<hr/>
	1,166	4 0		1,166	4 0
	<hr/>	<hr/>		<hr/>	<hr/>

The profit realized is about Rs. 424. Two females in the household help to milk and prepare food for the animals but this expenditure is not shown as the work is only part time.

The Agricultural Demonstrator states that this dairyman has been engaged in this business for the past 25 years and the above figures are fairly reliable. It is seen that if the milk is not diluted at all, the owner would make about Rs. 20 per month profit.

PIG BREEDING.

Usually the pig is despised in India by most people, this is probably due to the natural filthiness of the indigenous pig and the insanitary way in which it is maintained and also the people who breed and rear them.

The indigenous pig is black in colour, is badly shaped with an arched back, its form is coarse, it has flat sides and long legs with no hams worth mentioning, its snout is long and it is covered with coarse hair and bristles.

Compare this with the Australian Berkshire pig which is bred by the Madras Government at the Hosur Livestock Research Station. It is black in colour with a little white on the face as well as on all four legs just above the hoofs and a little white at the tip of the tail, the head is short and the snout is slightly turned up and broad, some have straight snouts, a good width between the eyes, ears are fairly long and erect, the jirois or jaws should be full and the neck short and thick, the back is broad and thick and generally straight, although some pigs have a slightly arched back. The ribs are well sprung, long, the sides are deep giving width from the back to the belly, the hind quarters well-developed and the hams deep and well-rounded, the legs short and fine in bone, they should be set squarely on the body, the tail fine and set high, the hair fine and abundant. The pig should present a compact appearance.

There is plenty of room for much improvement in the quality, size and conformation of the indigenous pig. This can be obtained by using a boar of some imported breed such as the Berkshire on the country sows, the first cross sows should be covered by another unrelated Berkshire boar and the country dams and halfbred boars fattened off and slaughtered. Continue this manner of breeding which is known as 'grading up' until you have secured the style of pig which you desire, even then, you will have to continue to use the purebred boars in order to preserve the improved race. It is not advisable to use the crossbred boars for breeding purposes unless they possess some special qualities. The first cross offspring I have seen from such crossings resemble the dam more, the head is long and narrow with a pointed snout, they are leggy, the back is straighter and not so arched, the sides and ribs are not so flat, the hair is finer though coarse. In each generation the pigs should resemble the Berkshire more.

The Berkshire boar is the best breed to use for crossing purposes, it has the power of propagating its qualities speedily to its progeny. It is hardy, prolific and stands the Indian climate better than any other breed. It is active and its litters are healthy and grow quickly. I have seen large Yorkshire Whites in the Hills which have not done so well.

The country pig takes fully 2 years to come to maturity and longer in some cases whereas Berkshire pig matures much earlier—10 to 15 months. I am informed that the first cross matures at about 18 months old.

In pig breeding every effort should be directed towards producing animals that will mature and fatten quickly and will yield a carcass with a well balanced proportion of fat to lean. Very fat bacon or pork is not appreciated in India.

Great care is necessary in the management and the selection of the boar. The tendency is to allow any boar to mate as he pleases, this is not good and is sure to end in failure sooner or later. Do not use a boar for breeding purposes which is not sound and healthy as this will be perpetuated in the offspring. Avoid a leggy animal. What is required are pigs with short legs, compact bodies, good girths and active.

The characteristics of a good sow are to breed large litters and to have the capacity to nourish them. The offspring must be quick growers and attain maturity quickly. The sows should be long, large and healthy. The special points to be observed in pigs used for breeding purposes are :—

- (1) That the sows are regular breeders and good mothers with plenty of milk,
- (2) that the litters are even in size and grow well,
- (3) that the animals while fattening are firm in flesh with fine and small bone and when killed the meat is streaky,
- (4) some breeders say that the udder of the sow is most important, and the belief held is that it should commence as close to the forelegs as possible and that the number of teats possessed by the sow is a very fair indication of her prolificacy and her milking capacities, and
- (5) a sow should possess at least 12 teats if it is to be used for breeding purposes.

Management.

The styes should be spacious and boars should be housed separately. The styes should be kept clean and well drained, the health of the animals depends on good sanitation and wholesome food. Pigs are soon taught to be clean.

Sows are generally served from 8 to 12 months old and their period of gestation is 112 days. Do not allow sows to be served earlier as this is injurious, the growth and maturity of the sow are injured, she has not enough nourishment for her young and the

offspring are necessarily small. Boars should not be allowed to run with the sows. All the pigs should have access to plenty of grazing and foraging for the usufruct of trees. If young pigs get plenty of exercise and grazing, they grow more quickly into stronger animals; do not let them grow too fat whilst growing. Boars should be allowed plenty of exercise also, otherwise, they will put on fat and become inactive at an early age. It is advisable not to use a boar for breeding purposes until he is fairly well grown and about 8 to 10 months old and he may continue as a breeding boar for 3 or 4 years.

If sows are allowed to get too fat, they will not hold to a service. When a young sow is about to be put to the boar it is advisable to reduce her ration and after she has been served to feed her well, this is said to have a tendency to increase the number of the litter. Two litters should be aimed at in a year. At Hosur the average number of piglings in a litter of the Berkshire breed is 9; this is good. Never allow a breeding sow to get into low condition, she will be very slow in coming into season.

Before farrowing time, the sow should be placed in a sty by herself and kept quiet and apart from the other pigs, she then becomes accustomed to her quarters before pigging. It is advisable that the man or boy in charge of the sow should be near to her when she is farrowing, it is not advisable to have a person there whom the sow does not know as she may attack him if he enters the sty. The afterbirth should be removed at once to prevent the sow from eating it, if she is allowed to eat it she may commence to eat her young afterwards. Some good bedding of hay or straw should be put in the sty and this should be changed every 4 days or so; avoid draughts as the young pigs are likely to catch cold and die. Allow the sow and her litter to exercise in the sun two or three days after farrowing as this helps to prevent rickets. Give molasses or some jaggery to the sow in her food for a week or so after farrowing; this will tend to promote milk secretion.

Feeding.

For breeding sows and boars, groundnut cake, rice and wheat bran are good with plenty of green vegetables or grass and separated milk if obtainable. Ground cholam and ragi is a good food. All pigs should be given a little mineral mixture and salt. About 5 per cent of their ration can be made up of fish meal; this is good for pigs, but must on no account be fed in large quantities as it is apt to taint the meat.

Generally the dam's milk is sufficient for the little pigs for the first 3 or 4 weeks. The sow should be fed on a little groundnut cake, bran, vegetables and separated milk together with an ounce of

mineral mixture made up of finely ground steam bone flour and lime. It must be noted that if separated milk is fed to pigs, it should be soured first as it is more nourishing. If the dam has not enough milk for her litter, the young ones may be given some whole milk at body temperature. When the young pigs are about 3 to 4 weeks old, they can be given soured separated milk. As they grow they should be given some concentrated food. It is essential to keep all the young pigs growing; do not allow them to lose condition as it will be found very difficult to regain it.

Adult pigs can be given crushed usufruct in their food; e.g., kernels of mango seeds are said to be very good both for fattening and milk production. Pigs will eat caschew nuts, tamarind seed, korukkapulli seed, jack fruit nests and plantains.

Young pigs when in good condition, should be weaned at 8 to 10 weeks old but if delicate and poorly grown, they may be allowed to suckle until they are 12 weeks old. When weaned, feed them on concentrated food and separated milk if available and keep them growing. Let them out for grazing and exercise as this is essential for development. It is no use half feeding them if you wish to make a profit; feed them well and keep them growing in good condition. House them in well ventilated and clean styes and give them straw bedding and keep them warm and dry.

Boar pigs not required for breeding purposes should be castrated at the age of 6 to 8 weeks whilst suckling, it is a simple operation but should be carried out by a professional Veterinary Surgeon as amateurs are liable to rupture the animal.

When fattening pigs for pork or bacon it is not advisable to feed much oil cake as this tends to make the fat soft and oily. We require a firm fat, therefore ragi and cholam ground into a meal should be fed to fattening pigs at least 2 months before slaughter. Berkshire pigs well fed and housed will kill in this country at about 140 lb. live weight at the age of 8 months or so.

In fattening pigs the object should be to produce the largest weight of valuable meat in the shortest time at the lowest possible cost. The character of the meat varies according to the composition of the food fed. Starchy foods are apt to make fat.

Grain fed to pigs should be crushed into a meal, otherwise a large quantity will pass directly through the animals and be washed. Vegetables are very good for pigs. Some pig breeders recommend the cooking of all the food to prevent wastage, whilst others say it is not necessary. Personally I do not think it is necessary except in the case of potatoes and these are better fed in a cooked condition. Potatoes are good for fattening pigs.

Some of the foods fed to pigs in India are maize, gram, cholam, ragi, potatoes, bran, kernels of mango seeds, etc. Do not feed too much maize as this tends to put on too much fat. Gram when crushed and cooked produces both flesh and fat and is a good feed for pigs. Ground ragi and cholam are also good both for flesh and fat. See that rice bran if fed to pigs, is free from sand as this is injurious to the pigs. Vegetables such as potatoes, cabbage, carrots, tomatoes, turnips, cauliflower leaves, etc., are good foods for pigs.

Pigs should be fed in troughs and during the last 2 months of fattening they may be fed 3 times a day, food should be mixed in a sloppy mash. Ordinarily pigs are fed twice a day, once in the morning and once in the evening, they should be fed at regular times each day.

In India, pigs thrive if they are washed daily, they like this. I have seen pigs wallowing in tanks and irrigation channels trying to keep cool in the day time.

Pigs must not be allowed to scavenge in the village; otherwise the breeder will find that no reliable person or firm will purchase his pigs for food. In many cases the meat of country pigs beems with worms or their germs.

A lot of Indian soils are deficient in minerals, therefore it is very advisable to include a little mineral mixture in the food of the pig daily. A good mineral mixture can be obtained from the Imperial Chemicals, Ltd., Madras; this contains all the necessary ingredients. Experiments have shown that pigs fed on a well balanced ration plus minerals thrive and put on more weight than pigs fed on the same ration minus the minerals.

Sows in pig should be fed on plenty of good wholesome food for a month before they are due to farrow. One has to consider that newly born pigs weigh anything from 1 to 2 lb. in weight at birth and this is a drain on the sow. A sow in pigs requires more food than a sow not in pig. The ration can be slightly reduced a day or two before farrowing; the bowels should be kept open at this period.

It has been proved that a pig weighing about 80 lb. will require 4 lb. of meal in order to add 1 lb. to its live weight whereas a pig weighing 320 lb. will require one-third more food or 5-1/3 lb. meal, etc., in order to produce 1 lb. increase in weight, therefore smaller pigs which consume more food in proportion to their weights than large pigs, give a better return for the food eaten.

Meals, cake, etc., fed to pigs should be soaked in water 12 hours before feeding it to them.

Pigs are difficult animals to treat when sick, they have generally to be thrown to administer medicine. In some cases if the sick pig is eating, medicine can be put in the food.

The diseases from which pigs mostly suffer arise from the digestive organs or are connected with the skin. Good housing wholesome feeding, sanitation and plenty of grazing will help to minimize these. If pigs suffer skin trouble such as blistering in the hot weather, apply a mixture of neem and coconut oil and rub this into the skin.

Ration for pigs.

1 to 8 weeks old—

Mother's milk supplemented by skim milk after a month old.

2 to 4 months old—

10 lb. separated milk—soured.

$\frac{1}{2}$ to 1 lb. groundnut cake.

1 lb. wheatbran.

4 oz. fishmeal.

$\frac{1}{2}$ oz. salt.

$\frac{1}{2}$ oz. mineral mixture

4 to 6 months—

10 lb. separated milk.

1 lb. cake.

1 lb. wheatbran.

1 lb. ricebran.

$\frac{1}{2}$ lb. ragi flour.

4 oz. fishmeal.

Salt and mineral mixture.

6 to 8 months—

10 lb. separated milk.

1 lb. ragi flour.

1 lb. crushed cholam.

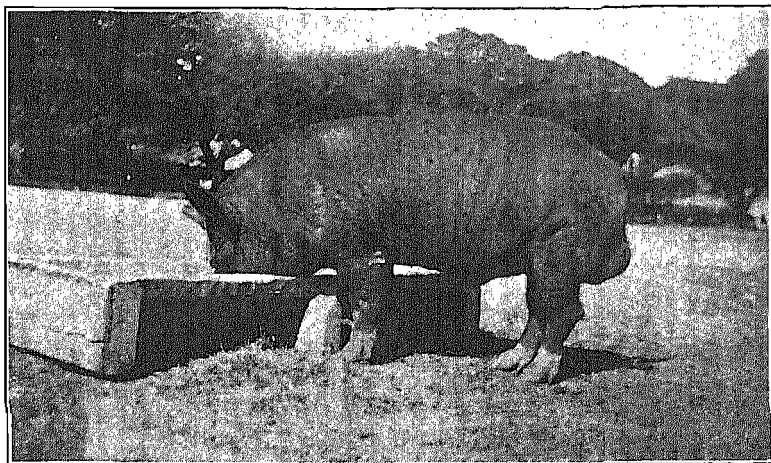
1 lb. wheatbran.

1 lb. ricebran.

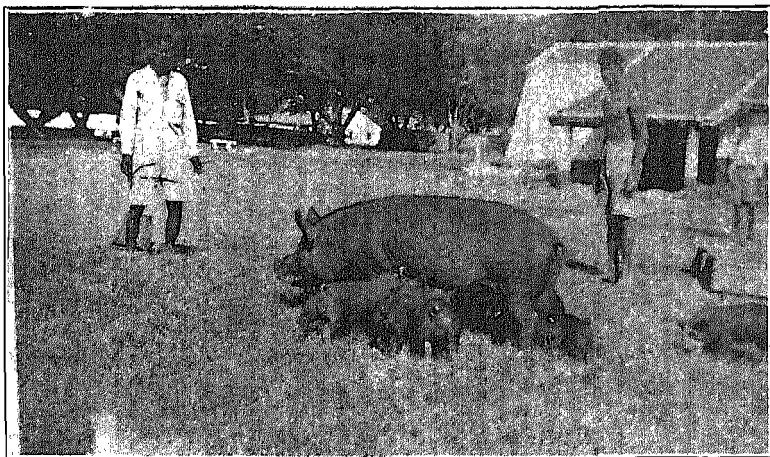
4 oz. fishmeal.

Salt and mineral mixture.

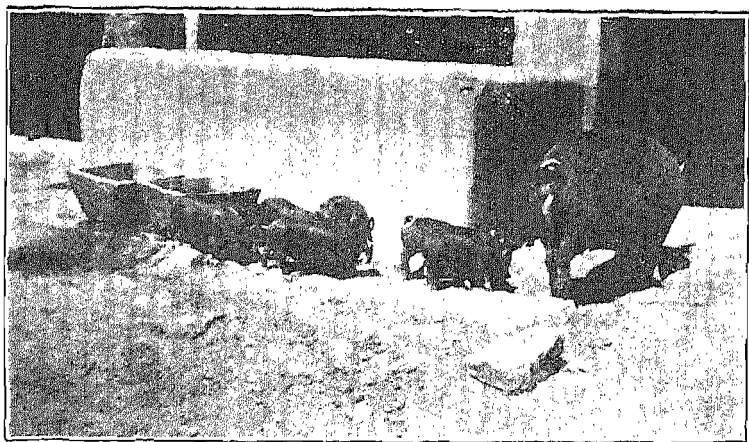
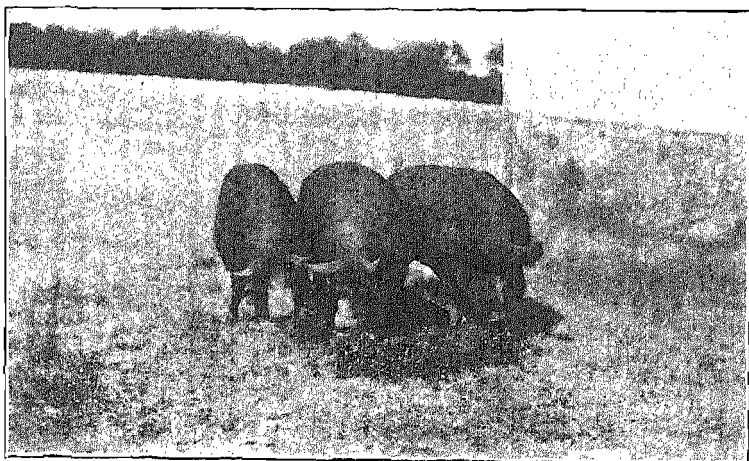
Plenty of vegetables, green grass, etc., can be fed in addition.



YOUNG AUSTRALIAN BERKSHIRE BOAR.



AUSTRALIAN BERKSHIRE SOW WITH LITTER.



AUSTRALIAN BERKSHIRE PIGS AT HOSUR.

TWISTS OR HAIR MARKS ON CATTLE.

TAMIL—SULI.

When a Hindu purchases cattle, the first thing he observes is (Suli) or twist. Those who have cattle with good marks will prosper whereas those with bad ones will not. Suli is observed chiefly by those who go in for a single animal for his house or those who want work animals for drives.

A twist, common in cattle, is the one situated in line with the umbilicus on the line from the head to the tail on the back of the animal. In some animals the twist is nearer the hump and in some nearer to the hip joint. Generally cattle have the ability to stir their coats behind the hump. If the twist is on this portion it is bad; but if it is a little away to the right or left of the ridge mark it is not considered bad.

If there are bad marks or twists on an animal, nobody will purchase it; therefore to hide these bad marks the sellers usually brand the skin over the marks.

LUCKY MARKS.

(1) *Thamani Suli* (தாமணிச் சுழி).—A ridge of hair along the middle line of the animal's back, about the centre or on either side of the neck—Thamani means a herd—indicates that the purchaser will acquire a large number of cattle.

(2) *Irattai Kavam* (இரட்டைக் கவம்).—Consists of two ridges of hair, one on each side of the brisket. A single hair mark on one side of the brisket (Othai-kavam ஒத்தைநககவம்) is most unlucky, and forebodes the loss of all other cattle in the house, and also the death of the purchaser.

(3) *Bashikam Suli* (பாஷிகம் சுழி) is a crown on the forehead above the line of the eyes—Bhashikam is a wreath worn by bride and bridegroom during the marriage ceremony—or *Jodi Suli* (ஜோடிச் சுழி): when the mark situated on the forehead is in a pair side by side. These indicate, if the purchaser be a bachelor or widower, he will soon marry. If the purchaser be a married man, he will either have the misfortune to lose his wife and marry again or the good fortune to obtain two wives.

(4) *Gopura Suli* (கோபுரச் சுழி).—A crown upon, in front of or immediately behind the hump, this is considered to be very lucky.

(5) *Nir Suli* (நீர் சுழி) is a crown situated on the middle line of the back just opposite to the opening of the urethra. Regarding this, the saying is (நீருனாலும் ஆகும், ஆருனாலும் ஆகும்)—the family will either be reduced to ashes or swell like a river. This mark is thus of a doubtful significance. A purchaser rather than

risk the evil consequences, will avoid the purchase. The ryots say that if a little earth be taken and rubbed on this hair mark, the bullock will void urine.

(6) *Erupuran (ascending centipede)* (ஏறு புரான்)—A ridge of hair on the hind quarters curving up to the back is a sign of coming prosperity. If the ridge curves downwards it is called *Irangupuran (descending centipede)* (இறங்குபுரான்) and indicates adversity to the purchaser.

(7) *Lakshmi Suli* (லக்ஷ்மிச் சுழி) is a hair mark situated on one side of the neck at some distance from the dewlap. Lakshmi is the Goddess of Fortune. This is considered to be the most lucky mark, but is rarely met with. A bullock with such a mark is highly esteemed, and fetches a large price.

(8) *Patti Suli* (பட்டிச் சுழி) is a twist on the hump and this is good. It indicates the animal will have a good number of its company in its shed.

(9) *Veehulhi Suli* (வீபுதிச் சுழி)—Two twists between the eyes along the eye-line; these are considered good.

(10) *Erunganam* (ஏறுநாகம்) is a single ascending twist on the outer side of the tail and is a good mark; *Erangunagam* is a twist at the same place which is a descending one which is a bad mark.

UNLUCKY MARKS.

(1) *Mukkan Suli or Agni Suli* (முக்கண் அல்லது அக்னிச் சுழி)—Three crowns on the forehead arranged in the form of a triangle is said to represent the three eyes of Siva of which one in the forehead will, if opened, burn up all things within the range of vision: this forebodes ruin to the purchaser.

(2) *Kudaimel-Kudai* (குடைமேல் குடை)—Two crowns one over the other on the forehead predict either prosperity or disaster. In the latter case it is called *Edi-mel Edi* (இடிமேல் இடி).

(3) *Othai Kavum* (ஓத்தைக் கவம்)—A single hair mark on one side of the brisket close to the middle line forebodes loss of all other cattle in the house, and the death of the purchaser.

(4) *Vilangu Suli*—fettlers (வில்ங்குச் சுழி)—Hair marks on the fetlocks of either pair of legs indicate that the purchaser will soon be in jail.

(5) *Padai Suli* (பாடைச் சுழி)—Two ridges of hair on the back on either side of the middle line on the croup indicate that the purchaser will soon need a coffin.

(6) *Pendilandhan Suli* (பெண்டிலந்தான் சுழி)—If the two ridges be still lower down above the anus and below the tail they are called *Pendilandhan Suli* and this denotes the purchaser will become a widower.

(7) *Irangupuran* (இறங்குபூராகம்)—Descending centipede—A ridge of hair on the hind quarters curving downwards indicates adversity.

(8) *Nagapadam* (நாகபட்டம்)—A ridge of hair on the haunch spreading out at one end like the hood of a cobra. If the hood is upwards it is termed *Munnagam* (முந்நாகம்) and if downwards *Pinnagam* (பிந்நாகம்).

(9) *Thattu Suli* (தட்டுச் சூழி)—Obstacle—A crown situated on the back between the points of the hips indicates that any business undertaken by the purchaser will fail.

(10) *Thudappa Suli* (துடப்பச் சூழி)—A hair mark on the side of the tail near the root sometimes extending as ridge over the back.

(11) *Virikkattu or Puttani Suli* (விறிக்கட்டு அல்லது புட்டாணிச் சூழி) is a twist on the hip joint which is bad for the owner.

(12) *Elukattu padaikattu* (எலுகட்டுப் பாடைக்கட்டு)—This is a twist on the lips and is a bad mark.

(13) *Val Mudangi* (வால் முடங்கி) is a single twist at the bottom of the inner side of the tail and is bad for the other animals of the owner.

(14) *Erangunagam* (இறங்குநாகம்)—is a twist on the outer side of the tail and is a descending one which is a bad mark.

OTHER SUPERSTITIONS.

(1) If a cow calves on a Sunday it is bad for the owner.

(2) If an animal is sold on a Wednesday it is bad for the other animals in the manger and therefore ryots will not sell animals on Wednesdays.

(3) If a ryot sells an animal, he will not part with the rope with which the animal was tied in his house. If he gives it away his wealth will decrease. Purchasers therefore bring their own ropes with them.

(4) A bullock whose tail has the root of the tuft of hair situated above the hock is said to have "Eruval" (எறுவால்) and to bring ill luck. A cow having Eruval is not objected to.

(5) A bullock having white hair, skin, horns and hoof is considered of weak constitution and not to be purchased.

(6) A black bullock is generally considered a jibber. If not a rogue, he is considered of great value according to the saying (காரிகால் மாடு கபடுவிட்டால் ஒண்ணே கால் மாடு) a black bullock is but the fourth of a bull, but if he be guileless he is a bullock and a quarter.

(7) A bullock with numerous small spots over the body like a deer is considered very lucky provided these spots do not increase in number.

(8) *Mattaikombu* means horns bent backwards ; this is a good sign in a cow. The saying is “மாடு வாங்கத் தெரியாதவன் மட்டக் கொம்பு மாடு வாங்கட்டும்”—let any man who does not know how to select a cow purchase one with horns curved backwards.

(9) *Nerkombu* is straight horns. *Mun-kombu* is horns pointed forwards and indicates spirit. *Suruttaikombu* is twisted horns and are considered good workers.

(10) *Kollikombu* (கொள்ளிக்கொம்பு)—Horns which are hollow and present white patches looking as if they were rotten are considered to be very unlucky.

(11) *Poongombu* (பூங்கொம்பு)—Horns with wide tops are also considered bad.

(12) If a cow at the time of purchase voids urine, it is considered a very good one, but if she passes dung it is considered bad. The reverse is the case with a bullock.

(13) A bullock which fails to cut the fourth pair of permanent incisors is called *Arukatti-madu* (ஆறுகட்டி மாடு) and is considered lucky (ஆறுகட்டி மாடு, ஆனைகட்டு வாழு), that is, one who purchases a bullock with only six permanent incisors will become rich enough to keep an elephant.

(14) A bullock which cuts only seven permanent incisors is unlucky to the owner. The saying is that one who purchases such a bullock should have his coffin ready.

ANNUAL CATTLE FAIRS AND SHOWS IN THE MADRAS PRESIDENCY.

January.

Kalugumalai : Kovilpatti taluk, Tinnevely district ; for Thai-Pusam—lasts about a fortnight ; nearest railway station : Nalatin-puthur 8 miles and Kovilpatti—12 miles.

Kalipatti : Salem district ; for three days during Thai-Pusam ; nearest railway station Kalipatti road.

Yammiganur : Adoni taluk, Bellary district ; for two days ; nearest railway station Adoni—18 miles.

February.

Mylar : Hadagalli taluk, Bellary district ; nearest railway station, Devaragudem.

Tiruchendur : Tinnevely district ; for two weeks ; Tiruchendur railway station.

Nirathanallur : Kumbakonam taluk, Tanjore district ; 6 miles from Kumbakonam railway station : Makam festival.

Madakondapalli : Hosur taluk, Salem district ; for Makam festival ; Hosur railway station.

Somakhatta : Hindupur taluk, Anantapur district ; 20 miles from Hindupur station.

Mecheri : Salem district ; Masi Makham festival ; for 5 days ; Mecheri Road station.

Tenagal : Hamlet of Karikanipalli, Kalyandrug taluk, Anantapur district ; for Maha Bahula Panchami ; 35 miles from Rayadrug station.

Sivalaperi : Tinnevely taluk, Tinnevely district ; for a fortnight : Gangaikondan railway station.

March.

Karuvatti : Harpanahalli taluk, Bellary district ; 12 miles from Renibennur.

Gurjala : Adoni taluk, Bellary district ; for two days : 32 miles from Adoni station.

Attur : Dindigul taluk, Madura district ; for Vandikaliyamman festival—6 miles from Ambatturai station.

Karamadai : Avanashi taluk, Coimbatore district ; 10 days from the Full Moon day ; Karamadai railway station.

Mechcheri : Salem district, Mechcheri Road station.

Gorantla : Kurnool taluk, Kurnool district ; for 4 days : Ulindakonda station.

Kalugumalai : Kovilpatti taluk, Tinnevely district ; for Panguni Utharam festival for 15 days ; nearest railway station, Nalatinputhur or Kovilpatti.

April.

Kadepalli : Chittoor district ; for 10 days ; nearest station Gudupalli : Jalarpet-Bangalore section.

Pudupatti : Salem district, Salem Town railway station.

Nilakkottai : Madura district, Mariamman festival ; Kodaikanal Road station 6 miles.

Kalludevakunta : Adoni taluk, Bellary district, for 3 days : nearest station Tungabadhra 10 miles.

Dainamdinne : Adoni taluk, Bellary district, for 3 days ; 28 miles from Adoni station.

Tallakulam : Madura taluk, Madura district, for Alagar festival ; nearest railway station, Madura, 2 miles.

Kannapuram : Hamlet Pachapalaiyam, Dharapuram taluk, Coimbatore district, for one week ; 20 miles from Uthukuli station.

Nangavalli : Salem district, for 5 days car festival ; nearest station, Mechcheri road.

Nathapatti : Dharmapuri taluk, Salem district; about the Full Moon; Dharmapuri railway station.

Sivalaperi : Tinnevely district; a fortnight about the Full Moon day; nearest railway station, Gangaikondan.

Pasuvanthanai : Kovilpatti taluk, Tinnevely district; a fortnight about the Full Moon; Kadambur railway station.

Kangundy zamindari : Rollagangamma festival; 10 days: Gudupalli station.

May.

Virapandi : Periyakulam taluk; Madura district, for 10 days for Marianman festival; nearest railway station, Teni—5 miles.

Tiruppur : Cattle and pony show: Tiruppur taluk, Coimbatore district; Tiruppur railway station.

Hiran : Karkal taluk: South Kanara district; for about 8 days; 38 miles from Mangalore station.

Avanashi : Avanashi taluk, Coimbatore district; for a week; Vanjipalaiyam railway station.

Santhebidnur : Hindupur taluk, Anantapur district; 6 miles from Hindupur station.

Nilakkottai : Madura district, for Narasingaperumal festival; 6 miles from Kodaikanal Road railway station.

Pudupettai : hamlet of Pachamalaiyankottai, Nilakkottai taluk, Madura district; during the Tamil month of Vaikasi; 5 miles from Ambathurai station.

Batlagundu : Nilakkottai taluk, Madura district; during the Tamil month of Vaikasi; 12 miles from Kodaikanal Road station.

Kaliarkoil : Sivaganga taluk, Ramnad district; nearest railway station, Nattarasankottai.

June.

Punganur : Chittoor district, for 15 days; Madanapalli Road station.

Kanniseri : Sattur taluk, Ramnad district; for 15 days; Tulukkapatti railway station.

Alwarthirunagari : Tiruchendur taluk, Tinnevely district; for 2 weeks; Alwarthirunagari station.

Muthulapuram : Kovilpatti taluk, Tinnevely district; during Tamil month of Ani for three weeks; 8 miles cart-track from Nalli station or 20 miles metal road from Kovilpatti station.

July.

Salaiputhur : Hamlet of Lakkayankottai, Palni taluk, Madura district; $1\frac{1}{2}$ miles from Ottanchatram station.

Vadamadura : Dindigul taluk, Madura district ; Alagar festival ; Vadamadurai railway station.

Venkatagiri : Chittoor district ; for 10 days from Full Moon ; Coromandel railway station.

Tiruttani : Chittoor district, during Adi Krithigai festival ; Tiruttani station.

August.

Pudupalaiyam : hamlet of Gettisamudram near Andiyur, Bhavani taluk, Coimbatore district ; 22 miles from Erode station.

Kilaviraghavapuram : Tinnevely taluk, Tinnevely district ; for two weeks ; nearest station, Kurichi or Palamkotta.

Sankaranainarkoil : Sankarankoil taluk, Tinnevely district ; for one month during Adi Thapas festival ; Sankarankoil railway station.

September.

Sivalaperi : Tinnevely taluk and district ; Gangaikondan railway station.

October.

Agaram : Dindigul taluk, Madura district ; for Muthalamman festival ; 7 miles from Dindigul.

Kilaviraghavapuram : Tinnevely taluk and district ; for 15 days ; Kurichi or Palamkotta railway station.

Dharakottah : Agricultural Exhibition, Aska taluk, Ganjam district ; during Dasara ; Berhampur railway station.

Gooliam : Hamlet of Doddamaridevarayasamudram. Kollegal taluk, Coimbatore district ; one or two days after Deepavali and Sivarathri festivals ; 61 miles from Maddur.

November.

Kulgunda : in Subramanyam village, Puthur taluk, South Kanara district, for a fortnight ; 66 miles from Mangalore.

Tiruvannamalai : North Arcot district, for 10 days for Thirukarthigai Deepam festival ; Tiruvannamalai station.

December.

Kizhur desam : Melati amsam, Kurumbranad taluk, Malabar district ; for a week ; Tikkotti railway station.

Note.—The months are only approximate. Approximate dates can be obtained from the Villagers' Calendar published every year by the Madras Agricultural Department which can be had at a cost of 1 anna from the nearest Agricultural Demonstrator.

MEASUREMENTS, ETC., OF THE VARIOUS BREEDS OF CATTLE.

MEASUREMENTS OF CATTLE.

Sex.	Age—years.	Height at shoulder behind hump.	Height at croup.	Height at elbow.	Length of point of shoulder to buttock.	Length of horn.	Length of ear.	Length of face.	Breadth of forehead.	Girth at chest.	Girth of forearm.	Girth of slank.	Length of neck.	Length of shank.	Colour of skin.	Colour of hair.
<i>Ongole Breed.</i>																
Bull	31	58	60	32	59	16 $\frac{3}{4}$	10	24	10	82 $\frac{1}{2}$	17	8 $\frac{1}{2}$	19	8 $\frac{1}{2}$	Black	White.
Do.	41	56 $\frac{1}{2}$	59 $\frac{1}{2}$	32	56	7	9	22 $\frac{1}{2}$	10	80	16 $\frac{1}{2}$	8 $\frac{1}{2}$	18	8 $\frac{1}{2}$	Do.	Do.
Do.	36	57 $\frac{1}{2}$	60	32	59	4 $\frac{3}{4}$	10	24	9 $\frac{1}{2}$	80	16 $\frac{1}{2}$	8	18	9	Do.	Do.
Do.	125	51	61 $\frac{1}{2}$	34 $\frac{1}{2}$	69	6 $\frac{1}{2}$	10 $\frac{1}{2}$	26	10	83	20	7	20	8	Do.	Do.
Do.	6	59 $\frac{1}{2}$	63	34 $\frac{1}{2}$	69	11	11	24	10 $\frac{1}{2}$	84	20	7 $\frac{1}{2}$	19 $\frac{1}{2}$	8	Do.	Do.
Do.	103	58 $\frac{1}{2}$	61	33	64	4 $\frac{3}{4}$	11	24	10	82 $\frac{1}{2}$	19 $\frac{1}{2}$	7 $\frac{1}{2}$	19	8 $\frac{1}{2}$	Do.	Do.
Average	..	58 $\frac{1}{2}$	61	33	62 $\frac{1}{2}$	8 $\frac{1}{2}$	10 $\frac{1}{2}$	24	10	82 $\frac{1}{2}$	18 $\frac{1}{2}$	8	19	8 $\frac{1}{2}$		
<i>Kangayam Breed.</i>																
Cow	76	51 $\frac{1}{2}$	54	28	51	11	10	20 $\frac{1}{2}$	8	69	18	6	19	8 $\frac{1}{2}$	Black	White.
Do.	60	51	53	29	54	5 $\frac{1}{2}$	10	19 $\frac{1}{2}$	7	67	18	6 $\frac{1}{2}$	18 $\frac{1}{2}$	8	Do.	Do.
Do.	90	53	55 $\frac{1}{2}$	29	53	6 $\frac{1}{2}$	10	20	7	68	17 $\frac{1}{2}$	6 $\frac{1}{2}$	19	8	Do.	Do.
Do.	93	52 $\frac{1}{2}$	56	29	52	9 $\frac{3}{4}$	10	19 $\frac{1}{2}$	7 $\frac{1}{2}$	68 $\frac{1}{2}$	18 $\frac{1}{2}$	6 $\frac{1}{2}$	18 $\frac{1}{2}$	8 $\frac{1}{2}$	Do.	Do.
Average	..	52	54 $\frac{1}{2}$	28 $\frac{1}{2}$	52 $\frac{1}{2}$	8 $\frac{1}{2}$	10	20	7 $\frac{1}{2}$	68	18	6 $\frac{1}{2}$	19	8 $\frac{1}{2}$		
<i>Kangayam Breed.</i>																
Bull	33	50	52	27	56	19 $\frac{1}{2}$	8	21	8	75 $\frac{1}{2}$	15 $\frac{1}{2}$	7	13 $\frac{1}{2}$	7	Black	Grey.
Do.	35	51 $\frac{1}{2}$	54	28	60	14 $\frac{1}{2}$	8 $\frac{1}{2}$	21	7 $\frac{1}{2}$	78	16 $\frac{1}{2}$	7	13	7	Do.	Do.
Do.	37	49 $\frac{1}{2}$	53 $\frac{1}{2}$	28	53	15	8 $\frac{1}{2}$	21	7	74 $\frac{1}{2}$	14 $\frac{1}{2}$	7	14	7	Do.	Do.
Do.	90	50	54	28	56	17	8 $\frac{3}{4}$	20	7	74	14	7	12	7	Do.	Do.
Do.	39	52	56	30	60	16	9	24	8	77	16 $\frac{1}{2}$	7 $\frac{1}{2}$	17	7 $\frac{1}{2}$	Do.	Do.
Average	..	50 $\frac{1}{2}$	54	28	57	16 $\frac{1}{2}$	8 $\frac{1}{2}$	21 $\frac{1}{2}$	7 $\frac{1}{2}$	76	15 $\frac{1}{2}$	7	14	7		

Cow	..	37	8½	49	51½	26	50	16½	9	18	7	69	13	6	13	7	Black ..	Grey.
Do.	..	32	8	48	50½	27	53	17	8	19	6½	65½	13	6	11½	7	Do.	Do.
Do.	..	46	6½	46	49	27	50	17½	7½	19½	7	62	12	6	12	7	Do.	Do.
Do.	..	48	6	47	49½	26	51	14½	8½	19	7	66	13	6½	12½	6½	Do.	Do.
Do.	..	55	5½	46½	50½	28	49	14	8	19	7½	62	11½	6	13	7	Do.	Do.
Average	..			47½	50	27	50½	16	8½	19	7	65	12½	6	12½	7		

Scindh Breed.

Bull	..	43	10	47	50	25	54	9	9½	22	10	66½	12½	7	12	7	Black ..	Red.
Do.	..	124	5½	47½	49	25	53	6	10	20½	8½	73	14	7	13	7	Do.	Do.
Do.	..	129	5½	48½	51	26	54	6	10½	21	10½	71	14	7½	12	7½	Do.	Do.
Do.	..	136	5½	49½	52½	27	55	5½	9	20	8½	74	15½	7½	14	7½	Do.	Do.
Do.	..	10	4	47½	49	24½	52	7½	9	21	9½	74	15	7	12	7	Do.	Dark brown.
Average	..			47½	50½	25½	53	7	9½	21	9½	71½	14	7	12½	7		

Cow	..	245	11	43	45	23	47	11½	10	18	7	64	13	6½	12	6½	Black ..	Red.
Do.	..	236	10	44	45½	24	46	10	10	19	7	62½	12½	6½	11	6½	Do.	Do.
Do.	..	38	10	43½	44½	24	48	7	9½	19	6½	64	12	6	10	6	Do.	Light red.
Do.	..	233	7	43	46	25	47	8	9	19	7	59	11	5½	11	5½	Do.	Red.
Do.	..	191	6	43½	45	25	45	6½	8½	20	8	63½	12	6	12	6½	Do.	Do.
Average	..			43½	45½	24½	46½	8½	9½	19	7	62½	12	6	11½	6½		

MEASUREMENTS, ETC., OF THE VARIOUS BREEDS OF CATTLE—cont.

Sex.	Age—years.	Height at shoulder hump.	Height at croup.	Height at elbow.	Length of point of shoulder to but- tock.	Length of horn.	Length of ear.	Length of face.	Breadth of forehead.	Girth at chest.	Girth of forearm.	Girth of shank.	Length of neck.	Length of shank.	Colour of skin.	Colour of hair.	MEASUREMENTS OF CATTLE—cont.	
Alambadi Breed.																		
Bull	7	52½	53½	29	48	15	9½	22	9	69	13	7½	20½	9	Black	..	Black.	
Do.	..	Aged 53	54	26	47	18	9½	20½	9	67	12	7½	22	9	Brownish black.	..	Very dark brown.	
Bullock	10	52	52	26½	49	15	9	22	8	67½	12½	7	19	8	Do.	Do.	Dark brown white patches.	
Do.	6	52	53	27	47½	14	9½	23	9	66	12½	7½	19	8	Black	..	White.	
Do.	6	55	56	29	49	14	9½	23	9	69	13	8	20	8	Do.	..	Grey.	
Cow	8	49	50	23½	45	19	9	19½	9	60	11	6	19	7	Flesh	..	White.*	
Do.	4	47	48	23	44	11	9	19	8½	60	11½	6	18½	7½	coloured.	..	White.	
Do.	4	49	50½	26	46	10	9	20	8	64½	11	7	20	7½	Blackish. Brownish.	..	Brown and white.†	
Tanjore Breed (Polled).																		
Bull	6	47	47½	26½	47	..	Ears clipped.	19	7½	63	13	7	15½	8	Black	..	Grey.	
Do.	4	48	48	26	49	..	Do.	18½	7	59	13	7½	15	7½	Do.	..	Do.	
Bullock	4	41½	42	24	40	..	Do.	17½	7	54	12	6½	14	8	Do.	..	Do.	
Do.	6	48½	48	24½	47	..	Do.	20½	7½	67	13½	7½	15½	8	Do.	..	Do.	
Do.	6	48	48	24½	46½	..	Do.	19½	8	63½	13	8	15	8	Do.	..	Do.	
West Coast (Malabar) Breed.																		
Bull	6	38½	40	22½	38½	8	7	17½	7	59	14	6½	15	7	Black	..	Brown.	
Do.	10	39½	41	22½	39	9	7	17½	7	63	13½	6½	14	7½	Do.	..	Do.	
Do.	6	38	40	21	37½	6½	6½	16½	6½	53½	13	6	12	7½	Do.	..	Do.	

* Pennasaram district.
† Kovakota district.

* Pennagaram district.

† Royakota district.

<i>Pulikulam or Jellicut.</i>												
Bull	..	3½	47½	48½	25	41½	10	9	18	8	63½	14
Do.	..	7-8	45½	47	24	43	12	8½	18½	8	65	14
Do.	..	7-8	45	46	23	44	11	8½	18½	7½	64½	14
Do.	..	4½	44½	45½	22½	41	13	7½	19½	8	66	13
Do.	..	8-9	43½	46	24	42	15	8	18½	8	61	12
Do.	..	5	44	46	25	41½	7½	8½	19	8	64½	13
<i>Bargur Hill Breed.</i>												
Bullock	..	10	46½	47	26	44	13½	8	21	8	57	11
Do.	..	9	48	49	25½	46½	14	7½	21½	8	58	11½
Cow	..	5	41	42	23½	41	17	9	18	7	56	10
Bullock	..	7	47	48	26	46	13½	8	20	7½	59½	11½
<i>Goomsur Breed.</i>												
Bull	..	..	47	48	..	45	..	..	..	..	62	..
Do.	..	..	44	46	..	42	..	..	..	..	60	..
Do.	..	..	45	45	..	50	..	..	..	..	67	..
Cow	..	..	41	42	..	36	..	..	..	..	50	..
Do.	..	..	39	41	..	38	..	..	..	..	53	..
Do.	..	..	38	39	..	32	..	..	..	..	49	..

8 Black .. Grey and fawn.
 7½ Do. .. Grey.
 8 Do. .. Grey black spots.
 8½ Do. .. Grey and fawn.
 8 Do. .. Do.
 7½ Do. .. Grey and dark grey

7½ Brown. Brown and white.
 7½ Brown. Do.
 6½ Brown and Do.
 8 white. Brown.

Black .. Grey.
 Do. .. Do.
 Do. .. Do.
 Do. .. Do.
 Do. .. Do.
 Do. .. Do.